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CONTENTS

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..THE IRON AGE..

NEW YORK, JANUARY 7, 1932

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MODERNIZE AND DIVERSIFY

A Practical Anti-Depression Policy for Industry

By G. L. LACHER

DEPRESSION has produced an abundance of panaceas but a dearth of new ideas. With tedious regularity proposals are made which draw their inspiration from collectivism of the Soviet, German or British models, from political dictatorship of the Mussolini type or from standpatism with its reliance on the corrective powers of the law of supply and demand.

Rarely is the suggestion made that all of the old-idea-patterns—from laissez-faire to Marxian socialism—may be out of date and unsuited for the stage of social evolution that the world is now entering. Yet there is much to support that conclusion.

Industry has given no sign of inherent weakness warranting a swing to Fascism or Bolshevism. On the contrary, it has shown great vitality, adaptability and resourcefulness in the face of extreme adversity. Some of its troubles, as, for example, in the production of raw materials, may find correction only by a retreat from laissez-faire, but most of its difficulties are due to external forces. Credit inflation, stock market speculation, real estate booms, post-war nationalism and rising tariff barriers all contributed to a condition in which production fed on production, piling up excessive productive capacity in many lines.

It is to these factors, rather than to industry itself, that we should look for the underlying causes of the depression and for fundamental correctives.

But industry is by no means without power to better its position. By modernizing methods and equipment it can reduce costs. By diversifying its output it can create new market outlets and at the same time raise the general level of demand for all industrial products.

In a word, old wants can be satisfied by discovering new wants. No stabilized, Government directed or operated economy can meet this challenge. It is a situation calling for the ingenuity and imagination of private enterprise.

RANTING at evil is a popular pastime during a period of wide-spread distress, but it calls for no great ability. What is needed today is not excoriating criticism of our economic system, but dispassionate analysis of what has befallen us and practical plans for reconstruction. Exaggeration and distortion of the causes and effects of the depression undoubtedly make interesting reading, but they becloud the facts and retard recovery.

An honest review of the boom period reveals that prosperity did not extend to all industries. It shows that management generally subscribed to the "high wage" theory, although in some lines company profits rose faster than labor rates. It discloses that prices remained virtually stationary or underwent a slow decline. It uncovers the fact that speculative buying of materials was at a minimum. It reveals that labor displaced by technical improvements was absorbed in new forms of employment.

Similarly, a résumé of the depression discloses much that is at variance with the generalizations of extremists. Industry was not caught entirely unprepared for adversity. It did not suffer sudden and universal paralysis; the profit motive was not unmasked as purely individualistic and selfish or as incompatible with humane considerations; there has been no unleashing of bitter class conflict; there have been no signs of weakening managerial vigor or of progressive moral decay threatening the permanence of capitalistic industrial enterprise.

Quite the contrary. Well conducted enterprises entered the period in a strong cash position, which in some cases has been maintained. In proportion to their resources, industrial managements generally have done much to mitigate the effects of hard times. Before the depression became acute large improvement programs were launched by public utilities, steel companies, railroads and other industries to provide employment. Later, rotation of shifts and similar expedients were adopted to divide available work among a maximum number of men. Extension of credit on food purchased from company commissaries was not uncommon. Rent reductions on company houses occupied by employees whose working time had been cut were made as a matter of course and without blare of trumpets.

Wage rate reductions were, in most cases, deferred as long as possible and usually after common stock dividends had been sharply cut or passed. A number of outstanding manufacturers adopted unemployment insurance, realizing its limitations as a means of coping with the present crisis but believing it in the interests of preparedness against future recessions in employment.

And what is most significant, industrial strife has been at a minimum throughout the depression — convincing testimony to the fundamental soundness of employer-employee relations, to that spirit of cooperation and mutual respect that has grown out of ever-increasing economic interdependence.

Industry Was Creature, Not Creator, of Unsound Economics

THIS record does not conform to the theoretical economics of those who advocate ruthless reduction of personnel and wage rates to drive down costs and restore business equilibrium. But industry's policy has been humane. It met the problems of the depression step by step, seeking at all times to postpone and allay individual distress. Who can say with certainty that resistance to cyclical forces was not wiser than a sudden, sharp readjustment of wages and employment? What assurance had industry, in view of the world-wide ramifications of the depression, that the simple recipe of the theorists would bring immediate relief?

But whatever the final verdict may be on the economic, as distinguished from the humane, policy of management during the current cycle, business itself was singularly free from uneconomic practices during the boom period. It was the creature rather than the creator of unsound developments. The post-war real estate boom resulted in excessive building. The stock market boom and American exports of capital contributed largely to overexpansion of productive capacity at home and abroad. Domestically, the basis for plant expansion was laid by the economies of mass production and an inflow of foreign business supported by our external financing. In Europe, construction of new capacity got its impetus from post-war nationalism, as well as from the effort of Germany to build up an export surplus from which to pay reparations.

Enormous investments in productive capacity on both sides of the Atlantic created a swelling demand for equipment and raw materials throughout the world and, by sustaining a high level of employment and a steady stream of profits, stimulated consumer industries likewise.

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THE novelties of yesterday are the staples of today. Likewise today's novelties will be the necessities of tomorrow. —A. W. Robertson, chairman of the board, Westinghouse Electric & Mfg. Co.

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Too Much of the Wrong Kind of Capacity

SO long as American capital continued to flow into both domestic and foreign enterprises all went well. But the wholesale diversion of surplus funds into Wall Street speculation at the height of the stock market boom cut off foreign financing and precipitated a collapse of our export trade. Stock market losses, in turn, quickly converted funds available for investment into deficits and obligations.

It was then and only then that we heard much about overproduction. And the reason that it had previously escaped notice was that production had fed on production. In other words, production had been misapplied.

It is, of course, obvious that no sound objection can be raised to the building up of production facilities in step with lasting increases in consumption. Creation of productive capacity—mechanization—has been the principal stimulus of Occidental progress since the industrial revolution. It is the mainspring of Russia's five-year plan. It provides that opportunity for economic growth without which both production and consumption would be doomed to stagnation. It is harmful only when misdirected, and this is not so easy to recognize —in time.

The difficulty lies in the illusion arising from the rapidly mounting demands for producer goods that accompany expansion of productive capacity. For a time machinery plants can be kept busy equipping new machinery plants and steel works can be employed supplying materials for new steel capacity, but in the end there must be a day of reckoning.

The world's industrial burden, therefore, is not too much productive capacity, but too much of the wrong kind of capacity. This unhappy condition might have been avoided if credit inflation had been held in check or if international commercial relationships had not been disorganized by the war. But pending the perfection of our faulty financial mechanism and the solution of the intricate problems growing out of the politico-economic maladjustments in Europe, there is much that American industry can do on its own initiative to improve its position.

Industry's Reconstruction Program

THE first practical move that suggests itself and the one that will bring the quickest returns is the modernization of methods and equipment. Manifestly the only way to reduce costs is to reduce them, and the best means to that end is improvement in management and technique.

Modernization implies expenditures, but those outlays not only will bring ample returns but will create demands for goods and jobs for men. Modernization calls for careful investigation of the latest cost-saving developments that industry has to offer. To aid in this study THE IRON AGE has assembled in this issue illustrations and descriptions of outstanding technical improvements of interest to all metal-working plants.

Another plank in industry's reconstruction platform will be a better balancing of demand and supply. In overcrowded fields some modification of our anti-trust laws will be sought so that production and employment may be stabilized and excessive building of new capacity discouraged. In most branches of industry, however, the effort will be to build up demand to the level of existing capacity.

Stimulation of demand requires intensive research to uncover new outlets for old products and to discover new wants calling for new products. The practical benefits to individual companies that have followed adoption of this policy are outlined in articles in this issue. But in reality the benefits are general. As new products are created and new plant capacity is built, the consumption of all industrial products is increased.

Blind plant expansion is a thing of the past. Production will be and must be modernized, but production policies will be subject to constant change as market research dictates. Inside problems will be coordinated with outside problems. Greater demand for existing products will be created by developing new products.

Diversification and modernization, rather than stabilization, will be the key to future prosperity. The ingenuity, imagination and energy that spring from private enterprise, rather than the stagnation and sloth of bureaucratic and socialistic regimentation, will provide the best insurance of continued industrial growth.

DIVERSIFICATION WAS MAJOR FACTOR IN 1931 SUCCESSES

By HERBERT R. SIMONDS

ANDREW CARNEGIE claimed he made his greatest progress in periods of business depression and in a similar way some manufacturers today are finding that the business recession is not without compensating factors. In this connection it is pertinent to recall that the wasteful and extravagant methods of manufacturing engendered during the war rush were brought to an abrupt halt during the depression of 1921 and the resultant economies paved the way for the succeeding years of prosperity.

During the two difficult years just past, far-sighted manufacturers have been setting their houses in order in preparation for the future and some have done this so well that successful operation under existing conditions has been possible.

Companies that have succeeded in overcoming the effect of generally reduced consumer demand may be grouped roughly in three classes.

1. Those engaged in a field which has expanded either because of, or in spite of, depression.
2. Those which have added new lines, new products, new ideas, to compensate for a decline in sales in their regular established lines.
3. Companies which have reduced overhead or effected other production economies in a manner to make operation profitable on a lower output.

Research Improves Product and Increases Its Marketability

Typical of the first group is the case of the Silent Glow Oil Burner Corpn., Hartford, Conn. The principal product of this manufacturer is a range burner designed to convert a coal or wood stove into an oil stove. This particular field was enjoying a gradually increasing demand before the depression gripped the country, but the general retraction in other lines instead of diminishing sales of range oil burners had a tendency to increase the demand for these burners because of the economies resulting from their operation. The Silent Glow Oil Burner Corpn., with sales in 1929 of 20,000 range burners, reports an increase to 40,000 for the 1931 production. This heavy increase, of course, is only partly due to the upward trend in the field. The company has a good product, has developed a large nation-wide sales organization and has installed new high-speed machinery and made other manufacturing economies. One of the principal parts of the Silent Glow range burner is the burner shell, a perforated cylinder of high-chrome steel.

Much research work went into the development of a successful method of perforating this material. Some of the difficulties had to do with burrs or roughness left on the back of the strip after punching and with suitable material for manufacturing the punch. The installation of a high-speed Henry & Wright punch operating at 140 strokes a minute and punching 152 holes in the strip at each stroke helped to solve some of the difficulties. Other operating efficiencies had to do with the forming and spot-welding of the perforated material into cylinders from which the burner shells are made.

The company manufactures many products other than the range burners, the next one of importance being oil burners for heating boilers. Foreseeing the trend in this line, the company several years ago developed and added to its products a compact inexpensive burner for household use, and the sales of this unit have shown a persistent increase even during the past difficult period.

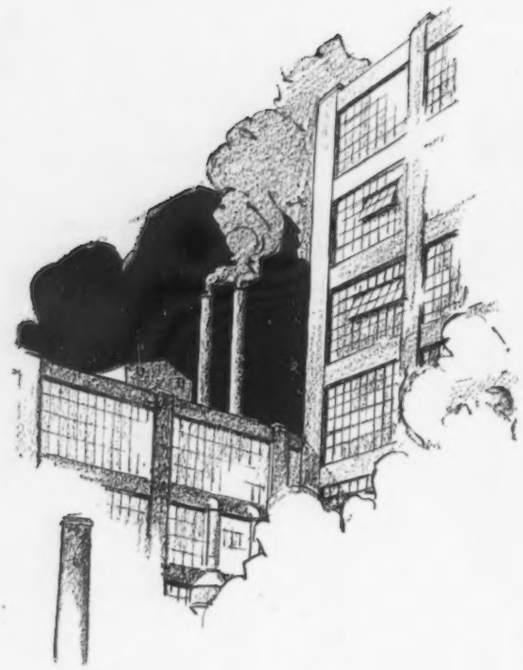
DIVERSIFICATION, more scientific marketing and lower unit sales costs are among this year's business objectives of New England manufacturers, according to returns from a questionnaire sent out by the New England Council.

In the first 386 ballots, the highest vote went to the objective described as "reducing expenses other than salaries or wages," 281 manufacturers citing this measure. "Increasing volume of sales" was second with 250 votes and "new products" was third with 198. "New uses for present products" received 119 votes and "application of market research", 104.

New Products Bring Success

Probably most of the companies operating successfully today come into the second group. One such company is the Caspers Tin Plate Co., Chicago. This company, realizing that the demand for its regular line of plain tin plate was somewhat restricted, decided to enter the lithographing field, believing that such a step would increase the scope of its business and result in an increased tonnage of tin plate. Representatives of the company have worked in conjunction with their customers to present to the buying public the most attractive containers of food products, as well as various advertising novelties. The result of this has been to create, through attractive display and package appeal, a better demand for their customers' goods and consequently for their own product, lithographed tin plate and black plate.

A typical example of the third group of manufacturers, i.e., those which have reduced overhead or achieved other production economies



DEPRESSION is characterized by underproduction of everything except remedies. But industry is no longer looking for a cure-all for its troubles. It realizes that the many complexities of world economic conditions sharply restrict the effectiveness of any measures it may take.

Nevertheless industrial management is resourceful and adaptable and, in its unremitting struggle with adversity, is finding ways of bettering its position. It has discovered methods of reducing costs by reorganizing and consolidating departments, by improving products and by introducing more efficient manufacturing equipment. It has succeeded in increasing its sales, in many instances, by adding new products to satisfy new wants.

While no single factor can be credited with bringing success to the companies referred to in this article, diversification of production was the most important. The author, however, has made no attempt to draw general conclusions; rather his purpose was to assemble specific information that might prove of suggestive value to other manufacturers.

so that they can operate profitably on lower output, is seen in the case of the United Aircraft & Transportation Corpn., Hartford, Conn. The various units of this organization have been consolidated at East Hartford, Conn., with marked improvement in operating efficiencies.

One of the units, the Hamilton Standard Propeller Co., formerly located in Pittsburgh, was moved in October, 1931, to space in the new large factory of the Pratt & Whitney Aircraft Co., manufacturer of Wasp and Hornet aeronautical engines. A third unit, the Chance Vought Corpn., manufacturer of the Vought Corsair airplanes, has been located next to the Pratt & Whitney Aircraft Co. and a fourth subsidiary, United Airports of Connecticut, owns and operates a 600-acre airport known as Rentschler Field, located directly behind the factories devoted to the manufacture of engines and airplanes. In one of its large modern hangars, the airport unit operates a complete overhaul and repair shop for Pratt & Whitney engines. A fifth unit of the parent company is the United Research Division, which functions as an experimental unit for the entire group. It is free to draw on the technical skill and experience of the other units and in a similar way other units exchange service and experience.

Extensive economies in operation have resulted from the close grouping of these units and the interchange of facilities. The large and well-equipped heat treating and plating department of the Pratt & Whitney Aircraft Co. now serves the other manufacturing units. Further economies have resulted from the mutual use of extensive experimental and testing equipment. Thus a large corporation retains the advantage of specialized and individual responsibility inherent in a unit manufacturing one line, such as airplane engines, and yet secures the added advantage of close manufacturing cooperation with avoidance of much duplication of equipment. The balance sheet of this group of companies for operation on reduced output for 1931 indicates its policies are all basically sound.

Where Diversification Saved a Business

An interesting case where management refused to be downed by a sharply declining demand is that of the Colt's Patent Fire Arms Mfg. Co., Hartford, Conn. Due to the tremendous need for revolvers, automatic pistols and machine guns during the war, the physical layout of this company changed radically. New buildings were put up, hundreds of new machines installed and the working force augmented by new thousands, all busy turning out these important products. The end of the war brought new problems. The small arms business dropped almost to the vanishing point and thousands of square feet of floor space in the large building had to be profitably utilized or the organization would not survive.

The solution was to bring in new products. First to come under the Colt management was a line of dish-washing machines formerly built under the Couch Dean patents and designed for use in hotels, restaurants, hospitals and schools. The line has since been increased to approximately three times its original size and has been aggressively merchandised. Small centrifugal models have been developed. The larger models are known as conveyor type machines and tableware is placed on a moving belt and carried through successive streams of hot solution. An important new product in this same division is a line of metal parts cleaning and drying machines which are rapidly gaining favor among manufacturers throughout the country.

In 1922 the Johns Pratt Co. was purchased and its activities moved into the Colt plant. This added a line of electrical equipment, as well as asbestos packing material for valves and pumps. Both of these features have been extensively developed by the Colt company, but the division of the plant developed most during the past year has been the plastics division. A moldable product known as Coltrock, resembling hard rubber in appearance but having many different properties, has been introduced for the manufacture of radio tube bases, bottle caps and for a large number of electrical specialties.

During all this expansion, the original fire arms division has been by no means neglected. New models have been added during the past three years which have greatly increased interest in target shooting,

and an aggressive merchandising campaign has brought an increase in sales to police and military units, as well as to target fans, farmers and outdoor enthusiasts.

Filling a Depression Need

The Perfect Circle Co., Hagerstown, Ind., did a surprising thing during the past year. It brought out a more expensive product and increased its sales of piston rings in the face of a declining demand for automobiles. When asked how this was possible, the manager said it came about through adopting a new idea in selling and right here it may be well emphasized that some kind of new idea was back of all manufacturing successes in 1931. The new idea of the Perfect Circle Co. was to broadcast the fact to garages and small distributers that new, properly designed piston rings in a used automobile engine usually make that engine behave about as well as a new engine. This idea played right into the spirit of the times and, when to it was added an improved piston ring with its new sales appeal, the combination seemed to work wonders.

The new idea in the case of the Ramet Corpn. of America, North Chicago, Ill., was the use of a new material, Ramet tantalum carbide for cutting tools and wire dies. Ramet is a development of the research laboratory of the Fansteel Products Co., Inc., North Chicago, and the Ramet company, in addition to manufacturing tools and wire dies, has licensed several tool manufacturers to furnish tools to the trade tipped with tantalum carbide.

New Marketing Methods Bring Results

Manufacturers of machine tools are usually as severely affected as anyone else during a time of business depression. During 1931 some tool manufacturers were able partially to offset the declining demand by an active campaign urging plant managers to take advantage of the quiet times and bring their equipment up to date in preparation for renewed activity in the future. A manufacturer of milling machines, however, added some of its own ideas to this campaign and reports successful operation during 1931. When approached for a quotation on milling machines by a large manufacturer of motors, the tool builder suddenly stepped out of the limited role of milling machine manufacturer into the broader role of general plant contractor.

It studied the problems of the motor builder and then submitted bids which covered the complete motor block line, including conveyors and auxiliary equipment, and it got the order. Since then, the tool company has used the same method with equal success in the case of an automobile manufacturer, and it is probable that it will continue to operate in its new role of plant engineer and plant contractor, thus demonstrating again that times of depression occasionally prove an advantage in disguise to some manufacturers.

Another machine tool manufacturer put a different kind of new idea into successful operation. Realizing that many of its customers needed new machine tools but could not afford to purchase them at present, it suggested the next best thing, that of having existing tools reconditioned. It sent out word to all owners of its own machines offering to take the machines back into its plant and rebuild them at attractive prices. In many cases small improvements, such as new types of bearings and new materials could be incorporated at the time of rebuilding. The tool users were quick to see the advantage and the plan operated so successfully that the tool manufacturer's shops kept busy throughout the year.

The Metalcraft Corpn., St. Louis, Mo., added new ingenious toys to its line and reports successful operation during 1931. Toys, in fact, have saved the day for many manufacturers. It appears that many people in times of depression have more time to think about the amusement of their children. One man, for instance, placed an order for a $3,000 set of electric trains and when questioned about this explained that it was for his three-year-old daughter. A recent article in *Fortune* states that A. C. Gilbert Co., New Haven, Conn., has enjoyed an active demand for its miniature structural steel and that it now employs over 700 men. The Lionel toy locomotive business also is flourishing and this manufacturer employs over 800 men making nursery rolling stock. Railroads and railroad presidents, as well as children, are his clients.

Eighteen 1931 Successes

An analysis of the Department of Commerce lists 18 manufacturers who met with success during the depression. A manufacturer of an automatic stoking device increased sales by stressing the money-saving character of the product and by studying its sales prospects and making a more direct advertising appeal. A Missouri manufacturer of electrical equipment and transmission lines attributes its increase in sales partly to the fact that it had 22 engineers design, develop and place on the market a new patented product every three or four weeks.

An aluminum and brass company expanded its business through a greater diversification of its lines of manufacture. As an instance of this, it equipped itself to handle nonferrous metal for architectural purposes, a field which has been increasing recently.

Made Work Raises Operating Efficiency

An interesting use of color in a plant is reported by one manufacturer. As the volume of business declined this manufacturer, instead of letting some of its workers go, gave them the job of painting the machines and equipment inside of the plant. Bright, gay colors were selected and where movable machinery was concerned contrasting colors were used. Employees became greatly interested and afterward took pride in keeping the machines and surroundings clean. The unlooked for result of this effort to provide work for part of its shop force was an increase in operating efficiency. Relieved eye-strain resulted in no reportable accidents for nine months and in fewer rejected products during manufacture. The morale of the plant was increased and the sales force was helped in its work by the improved esprit de corps of the production department. Some advantageous publicity due to the use of the colors was a by-product.

The development of new wrinkles and new machines has been stimulated by the depression.

A pencil sharpener designed to use old safety razor blades has brought in large sales for one manufacturer. Another case of increased sales is reported by a company which developed a new type of glass cutter. The head of this cutter is equipped with a felt pad connected with a small oil reservoir.

CULTIVATE MARKETS OR

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COMPETITION is changing in character and in pace. The destinies of any commodity industry are no longer shaped by producers. They are largely controlled by the progress and developments in the manufacturing industries which use the commodities in question as their materials. The manufacturer's production problems determine the choice of materials, not the superior strength and efficiency among the rival suppliers bidding for his business. This lesson is one of the most significant phenomena being disclosed in these times of clear-cut competitive issues.

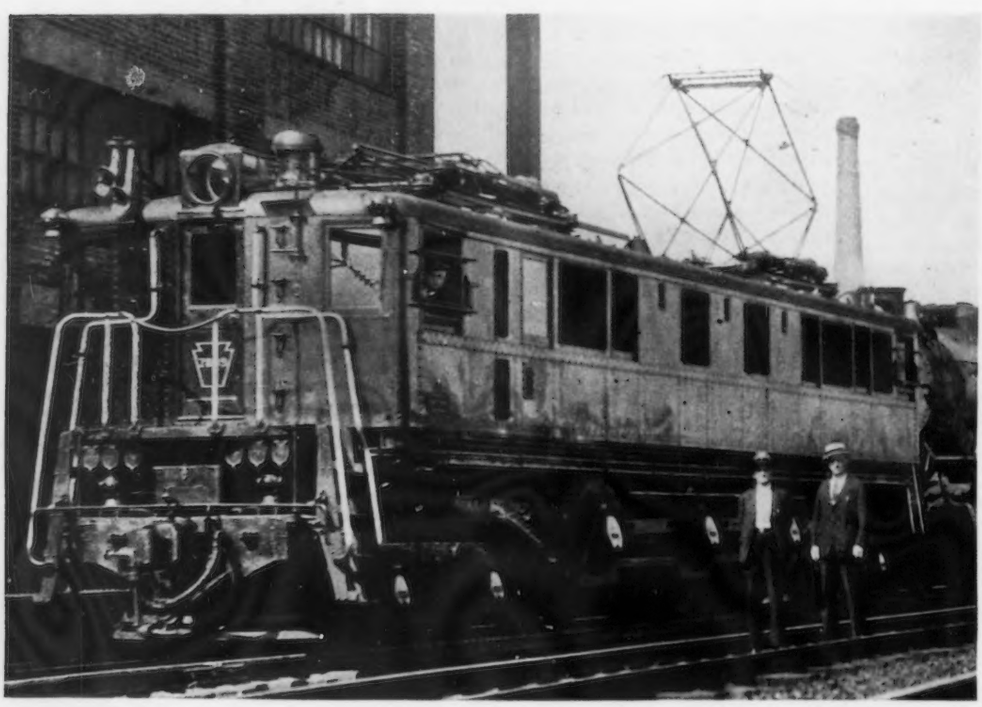
The industrial executive must keep abreast of all developments not only in his own line, but in the manufacturing industries supplied by him, so as to meet and forestall competition from every possible quarter. This was true enough three years ago; it is more vital than ever now. Forward-looking research, adequate and timely information, thoroughly disseminated throughout the entire working personnel; concerted defensive and offensive action by the industry as a whole, through the medium of its national association, to grapple with problems beyond one's individual vision—these are the dials and gages for him to keep going and watch constantly. There is no other by-pass to success. The keenest blade does the most cutting now.

Sacrifices Made to Economy

THE need of these defensive and offensive activities is quite generally recognized, in principle. Yet, as if a pall had settled on industry, all this work seems to be shoved aside or gets but casual, grudging attention. Much that is worth the doing is being sacrificed to the juggernaut of Economy.

It is one thing to throw overboard superfluous ballast; it is quite another to jettison precious cargo and irreplaceable tools. Many business executives profess to be aware of all that, but to be driven by circumstances to a policy of extreme retrenchment and caution, ahead of every other consideration.

The advantages of an aggressive policy appear dubious to them. Their eyes are glued to two gages only—the cash account and the fluctuation of the company's stock. Between the two, they can see only this: "Every dollar saved by the treasury shows up as one dollar to the good in the quarterly statement of earnings; a dollar's worth of business, at the present ruinous price levels, may show doubtful returns, may indeed show up in the red. And a poor statement of current earnings will only make matters still worse in the stock market. By cutting costs to the utmost, we are better able to compete for what little business there is going than by keeping up long-range expenditures which may, questionably, at some future time bring worthwhile results."



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PENNSYLVANIA Railroad new electric locomotive No. 7899, Class P-5, now being used in test operation between Wilmington, Del., and Trenton, N. J., is sheathed and roofed with aluminum alloy sheets.

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LOSE THEM

By L. J. LEWERY

AGGRESSIVE cultivation of markets is necessary for both offensive and defensive purposes. Failure in these times to carry on promotional study, research and consistent merchandising not only means a sacrifice of new business possibilities but frequently the loss of old markets as well. Ruthless retrenchment in the interests of economy is a penny-wise policy, declares the author. Producers, he says, must keep in intimate touch with their customers to take advantage of new outlets for old products and new opportunities to develop new products.

But that logic is reckoning with direct competition only. All these drastic economies may go for naught if, through this time-marking policy, a situation is created causing the manufacturer or the fabricator to change his practice and switch to different materials altogether. There follows an example.

The Lesson of Substitutions

THE Public Service Corpn. of New Jersey needed a huge surface condenser to serve a 75,000-kw. turbine at Kearny. It was to be a giant of some 65,000 sq. ft. of surface. Big condensers have been commonly, if not invariably, built of cast iron. The shell alone of this condenser, if designed on standard lines, would have weighed approximately 80 tons. The Westinghouse Electric & Mfg. Co. at Philadelphia, by redesigning the body of the condenser for a shell of steel, welded throughout and eliminating the preparation of a costly pattern, substituted sheet steel for cast iron, cutting the weight of the shell one half. That simplified the problem of transportation, too, partly because of the saving in weight, reduced to 425,000 lb., partly because the welding method will permit partial assembly of the exhaust connections and condensate tank, likewise built of sheet steel, on the erection site.

The condenser will be the largest of its kind ever built. Once the feasibility of the sheet steel condenser is demonstrated in practical operation, the concomitant advantages of lighter construction and ease of repair will have opened another outlet for sheet steel tonnage.

On the other hand, refinements in the microstructure of gray iron achieved during the past decade have caused machine builders in many instances to turn once again to castings which had been previously replaced by pressed steel parts.

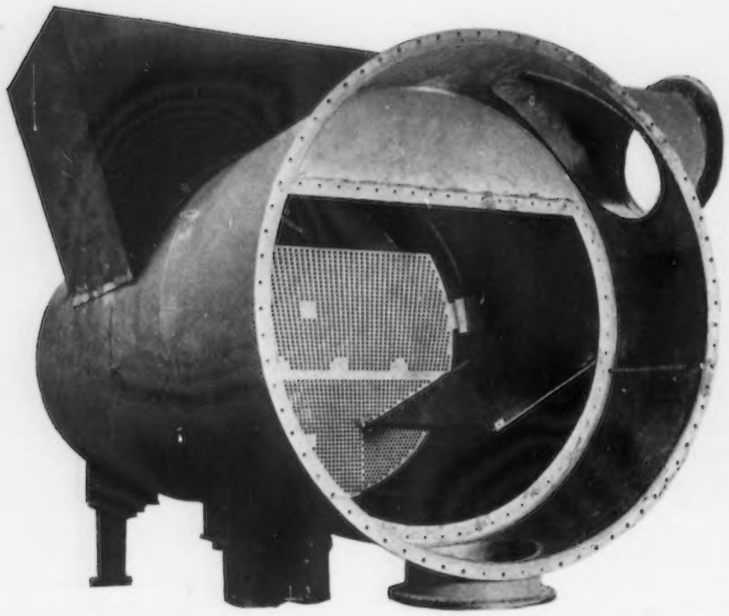
The engineering department of the Chevrolet plant of General Motors, by redesigning a certain sheet steel job and substituting castings, was able to reduce the cost of each part 18c., which meant a saving of $180,000 on the basis of a million cars a year, then an additional 24c., which saved $240,000 more, finally bringing the cost of the castings below that of the original sheet metal part.

For 10 years brake drums for trucks, buses and large automobiles had been made of pressed steel. They showed considerable wear and at 30,000 miles pretty generally reached the limit of usefulness. Now gray iron castings are giving well over 100,000 miles with little sign of wear, as shown in the illustration. Moreover, the brakes wear smoothly and noiselessly.

Switching to Non-Ferrous Metals

SUPPOSING, however, the fabricator discovered that he could dispense with either iron or steel al-

Meehanite cast iron brake drums replacing steel pressings in heavy-duty motor vehicles with substantial saving in cost and reduction in wear.



CONDENSER is of single-pass design. Tubes are ⅞-in. in diameter, 24 ft. in active length and are rolled into tube sheets at both ends. Propeller pumps are provided to circulate 105,000 gal. per min. against 32 ft. total head.

together? What if other manufacturers found it advantageous to switch to other materials? What would that do to the quarterly statement of earnings?

The Pennsylvania Railroad will shortly launch at Philadelphia the first "pattern" electric locomotive of the series P-5A of 90 giants for the Washington-New York passenger service, the greatest and most powerful yet designed. These monsters of 3750 hp. each, capable of hauling a string of 14 Pullmans with service cars at a speed of 90 miles an hour, without ever needing a "double-header," will be 62 ft. 8 in. long and will weigh 375,000 lb. each. Of the total number, 54 are being built by the Baldwin Locomotive Works in conjunction with Westinghouse, in Philadelphia; the remainder in the railroad's shops at Altoona, in conjunction with the General Electric Co.

Considerable Saving in Weight Achieved

The weight of the passenger engines, as originally projected, would have been about 415,000 lb. The saving of 40,000 lb. per engine was achieved by substitution of aluminum alloys for sheet steel in the external sheathing and roofing of the whole machine from the main frame of the locomotive bed, including even the headlight casings. This substitution represents a loss to the steel industry of some 2580 tons of sheets and plates. Moreover, the Pennsylvania Railroad is reported to be experimenting also with all-aluminum trains for suburban service.

Development of Aluminum Alloys Has Been Rapid

RAPID as has been the progress in the development of alloy steels, the progress in development of aluminum alloys has been even more spectacular. Within the memory of men now living, metallic aluminum was more precious than platinum. When King Prajadhipok of Siam—the grandsire of the one who recently left our shores—visited the Paris World Fair in 1855, he expressed a desire to take back to his country the most expensive article he could find as a souvenir. Nothing was discovered more unique or expensive than an aluminum watch charm. Yet alumina, the source of aluminum, is the commonest mineral on earth. It represents roughly 8 per cent of the earth's crust, while iron accounts for 5 per cent.

Alloying Gets Impetus

But it is only since the World War that research work in the aluminum industry has made rapid strides in the development of various aluminum alloys which impart to the base metal greater strength, toughness, plasticity and many other physical properties lacking in it. It is claimed indeed that the greater part of the modern metallurgist's advance in the alloying of steel was inspired by the study of the microstructure of various alloys of aluminum!

Less than two years ago it was difficult to pour aluminum ingots weighing more than 200 lb. Today sound ingots can be cast weighing

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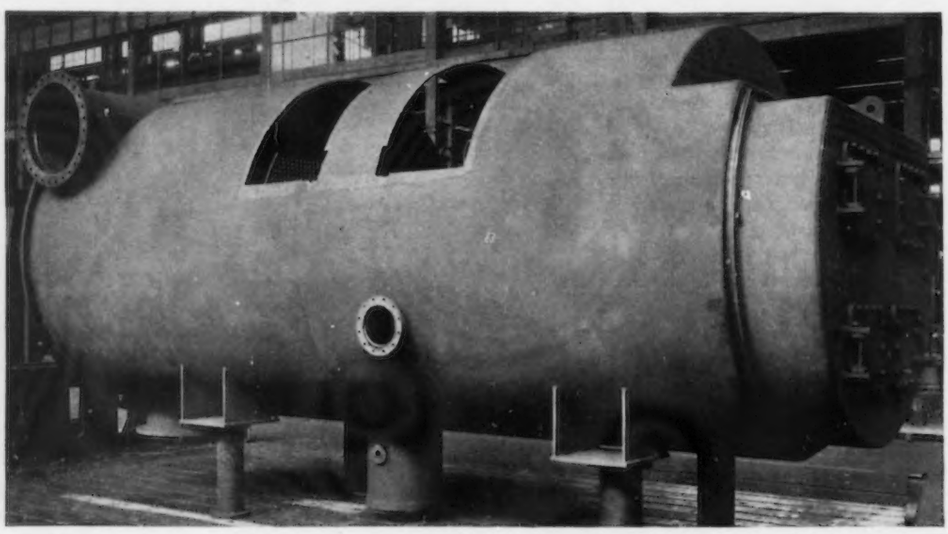
WESTINGHOUSE 65,000 sq. ft. surface condenser being built to serve 75,000-kw. turbine for United Engineers & Constructors Corpn. to be installed at Kearny plant of Public Service Corporation of New Jersey. The shell, exhaust connection and condensate tank are made of sheet steel and welded throughout.



more than a ton apiece. From these, structural shapes 80 and 90 ft. long can be rolled similar to those made of steel. Will aluminum skyscrapers come next?

Dangers in Ruthless Retrenchment

THE above instances are cited merely to demonstrate the fatuousness of the argument that ruthless retrenchment in cost of promotional study, cooperative research, widespread publicity will save industry and "tide it over the present depression."

Machines can take the place of thousands of men in production only, but distribution ever was and ever will be a human problem. The spirit of teamwork, of loyalty, of tradition cannot be sustained in the personnel of a corporate body that has become a mere mechanism. Esprit de corps does not exist in a corpse. Mere efficiency cannot uphold the structure and save it from disintegration.

Detail of welding of exhaust connection of condenser.

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Further Shrinkage in Alloy Steels

RETURNS from nine steel producers making alloy steel, including two of the largest units of all, show for 1931 rolled alloy steel amounting to 423,451 gross tons. Included in this is a small amount of forgings. All figures, of course, are on the basis of production in 11 months or more, with an estimate for at least a portion of December. The total reported is 46 per cent below that reported a year ago.

These returns do not include certain large tonnages of steel covered in the figures to be reported later by the American Iron and Steel Institute. Prominent among the missing items are copper-bearing steel, and a number of other alloy steels in which the alloy constituent is below certain minimum percentages.

In the table is shown the distribution of the alloy steel tonnages reported by the nine companies. This not only gives the different types of steel, but also specifies the consuming industry into which the steel went.

About 89 per cent of the total consists of steel bars, and 90 per cent of the bars went into the automobile industry. And 84 per cent of the entire alloy steel tonnage reported was absorbed by that one industry.

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Alloy Steel Production and Main Channels of Consumption in 1931

(Gross Tons, as Reported by Producing Companies)

	Plates	Structural Shapes	Bars	Black Sheets	Tubes and Pipe	Wire Products	Strip Steel	All Other Finished	Billets, Slabs and Forgings	Wire Rods	Totals
Railroads (cars and locomotives)	72	....	2,380	130	....	43	1	....	1,037	....	3,663
Railroads (buildings and bridges)	....	....	39	....	....	....	....	....	2	....	41
Railroads (track work)	....	....	166	....	....	1	....	....	2	....	169
Building construction	20	1	2,046	296	....	3	74	....	11	....	2,451
Concrete reinforcing companies	....	....	3,436	1	....	6	2	....	60	....	3,505
Building hardware and trim	....	....	44	239	....	....	36	102	....	....	421
Automobiles and parts	215	65	340,531	1,091	81	109	1,265	921	12,352	4	356,634
Oil, gas and water companies	105	....	700	369	720	6	....	....	152	....	2,052
Mining and lumbering companies	....	....	134	154	....	3	1	....	....	....	292
Agricultural implements	....	....	5,799	14	....	61	135	....	1,096	....	7,105
Containers (cans, drums, barrels)	....	....	13	143	....	52	78	....	....	....	286
Shipbuilding	....	7	44	....	....	....	....	....	....	....	51
Boilers and tanks	....	....	242	13	83	3	10	....	589	2	942
Machinery and hand tools	149	2	2,410	8	....	24	283	....	449	....	3,325
Bolts, nuts and rivets	....	....	360	1	....	251	1	....	1,258	....	1,871
Electrical manufactures	....	....	548	357	....	3	52	....	3	....	963
Forgers	....	....	9,814	....	....	5	....	....	887	....	10,706
Pressed and formed metal	....	....	439	600	....	100	304	....	1	....	1,444
Furniture and stoves	....	....	244	918	....	98	32	....	....	....	1,292
Jobbers and warehouses	....	....	1,916	961	....	416	168	....	341	....	3,802
Exports	24	1	1,410	55	....	....	510	....	54	5	2,059
Miscellaneous	1,235	43	5,865	2,090	103	205	570	2,609	7,657	....	20,377
Totals	1,820	119	378,580	7,439	987	1,389	3,522	3,632	25,951	11	423,451

WORLD OUTPUT OF PIG IRON AND STEEL DECLINED SEVERELY

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Table of World Production of Steel Ingots and Castings in Millions of Gross Tons

Country	1913	1927	1928	1929	1930	1931*
United Kingdom	7.66	9.10	8.52	9.64	7.33	5.27
Germany	11.99	16.06	14.29	15.99	11.36	8.46
France	6.86	8.18	9.35	9.55	9.30	8.00
Belgium	2.43	3.66	3.87	4.07	3.42	3.16
Luxemburg	1.31	2.43	2.53	2.66	2.24	2.04
Saar	2.05	1.86	2.04	2.17	1.91	1.56
Russia	4.75	3.53	4.18	4.76	5.46	5.00
Poland	1.03	1.23	1.41	1.36	1.22	1.15
Sweden	0.58	0.49	0.57	0.68	0.60	0.50
Spain	0.30	0.65	0.78	0.97	0.86	0.75
Austria	2.58	0.55	0.63	0.62	0.53	0.46
Hungary		0.46	0.48	0.50	0.36	0.30
Czechoslovakia		1.60	1.71	2.11	1.81	1.50
Italy	0.92	1.57	1.93	2.11	1.75	1.44
United States	31.30	44.94	51.54	56.43	40.70	25.70
Canada	1.04	0.92	1.24	1.39	1.01	0.75
Australia	0.01	0.47	0.46	0.46	0.42	0.36
India	0.06	0.57	0.41	0.58	0.62	0.61
Japan	0.24	1.70	1.84	2.05	2.26	2.00
China and other countries	0.04	0.20	0.20	0.33	0.17	0.14
Total	75.15	100.17	107.98	118.43	93.33	69.15

*Partly estimated.
Data revised for some years from those previously published.

Table of World Production of Pig Iron in Millions of Gross Tons

Country	1913	1927	1928	1929	1930	1931*
United Kingdom	10.26	7.29	6.61	7.59	6.19	3.75
Germany	10.73	12.90	11.62	13.19	9.54	6.18
France	8.93	9.18	9.82	10.20	9.88	8.35
Belgium	2.45	3.69	3.84	4.03	3.35	3.14
Luxemburg	2.51	2.69	2.73	2.86	2.43	2.03
Saar	1.35	1.74	1.91	2.07	1.88	1.52
Russia	4.55	2.92	3.22	4.24	4.90	4.30
Poland	0.60	0.61	0.67	0.69	0.47	0.38
Norway	...	0.08	0.08	0.14	0.12	0.10
Sweden	0.72	0.45	0.43	0.52	0.49	0.40
Italy	0.42	0.53	0.56	0.71	0.57	0.50
Austria	2.31	0.43	0.45	0.45	0.29	0.20
Hungary		0.29	0.30	0.28	0.25	0.20
Czechoslovakia		1.30	1.54	1.62	1.42	1.20
Spain	0.42	0.60	0.56	0.74	0.59	0.50
Roumania	...	...	...	0.10	0.10	0.10
Holland	...	...	...	0.25	0.27	0.26
United States	30.97	36.57	38.16	42.61	31.75	18.50
Canada	1.02	0.77	1.08	1.16	0.81	0.55
Australia	0.05	0.55	0.41	0.42	0.45	0.38
India	0.21	1.15	1.05	1.35	1.18	1.15
Japan	0.24	1.26	1.50	1.55	1.63	1.45
China and other countries	0.16	0.40	0.40	0.46	0.84	0.59
Total	77.90	85.40	86.94	97.23	79.40	55.73

*Partly estimated.
Data revised for some years from those previously published.

Table of Steel Exports and Imports of Leading Countries in Millions of Gross Tons

Exports	1913	1927	1928	1929	1930	1931*
United States	2.89	1.94	2.35	2.48	1.63	0.75
Great Britain	4.97	4.20	4.26	4.39	3.16	1.75
Germany	6.20	4.23	4.64	5.48	4.47	3.25
France	0.58	5.60	4.99	4.21	4.00	3.00
Belgium	1.55	4.61	4.46	4.52	3.85	3.00
Total	16.19	20.58	20.70	21.08	17.11	11.75
Imports	**1913**	**1927**	**1928**	**1929**	**1930**	**1931***
United States	0.25	0.69	0.69	0.65	0.51	0.35
Great Britain	2.23	4.41	2.89	2.82	2.91	2.20
Germany	0.30	2.23	2.02	1.44	1.12	0.75
France	0.17	0.13	0.14	0.25	0.47	0.25
Belgium	0.87	0.64	0.87	0.98	0.67	0.40
Total	3.82	8.10	6.61	6.14	5.68	3.95
Export excess	12.37	12.48	14.09	14.94	11.43	7.80

*Partly estimated. Luxemburg included in Belgian total.
Scrap not included in these data.

CLEARLY emphasizing the wide extent of the world economic depression, pig iron and steel production for the world last year declined decidedly. The totals for both were not so low as those for 1921 but they were less than the totals of the pre-war year, 1913.

It has been possible to assemble fairly accurate estimates of the pig iron and steel ingot and castings output of the producing countries, with the cooperation of the National Federation of Iron and Steel Manufacturers of London, England. These data are found in the accompanying tables.

Pig iron production last year approximated 55,730,000 gross tons with data for the last month or two estimated. This is a decrease of 30 per cent from the 1930 output of 79,400,000 tons. Compared with 1921, the year of the last major depression, when the production was 37,680,000 tons, the 1931 total is larger by nearly 50 per cent.

The 1931 steel output, estimated in the same manner, was 69,150,000 tons, revealing a decline of 26 per cent from the 1930 total of 93,330,000 tons. Compared with a total of 43,510,000 tons in 1921, the increase last year was about 59 per cent.

Last year the American pig iron total was only about 33 per cent of the world total as contrasted with 40 per cent in 1930. The American proportion of world steel output last year was about 37 per cent which compares with 43 per cent in 1930. In 1929, the record year in production, the corresponding figures were 43.8 per cent for pig iron and 47.8 per cent for steel.

As in 1930 so in 1931 a feature of operations in Europe was the large production of Russia. That country's pig iron and steel output, while not so large as in 1930, exceeded the pre-war or 1913 record, which is not true of other large producing nations. The decline this year for Germany was especially pronounced, largely exceeding that for France.

Exports of iron and steel from the six leading nations last year, estimated at 11,750,000 tons, declined sharply to a level about 28 per cent under that of 1913 and 32 per cent under 1930.

...Steel Consum

FOR the second year in succession, and the third time in five years, building and other construction last year consumed more American steel than did any other form of activity. On the basis of returns from 51 companies, producing over 97 per cent of the year's output, it develops that buildings and construction generally (excluding railroad buildings) absorbed about 18½ per cent of the total finished steel, against 19 per cent in 1930 and only 16½ per cent in the two preceding years.

Automobile production was in second position, as last year, but slightly increased its ratio, taking 16 per cent of the steel against 15½ per cent in 1930. Automobiles were in the lead in both 1929 and 1928, with 18 per cent each time.

In third position were the railroads, with 13½ per cent, a decided shrinkage from the 15 and 17 per cent respectively of 1930 and 1929. For reasons well known, the railroads have not been buying much steel in the past year.

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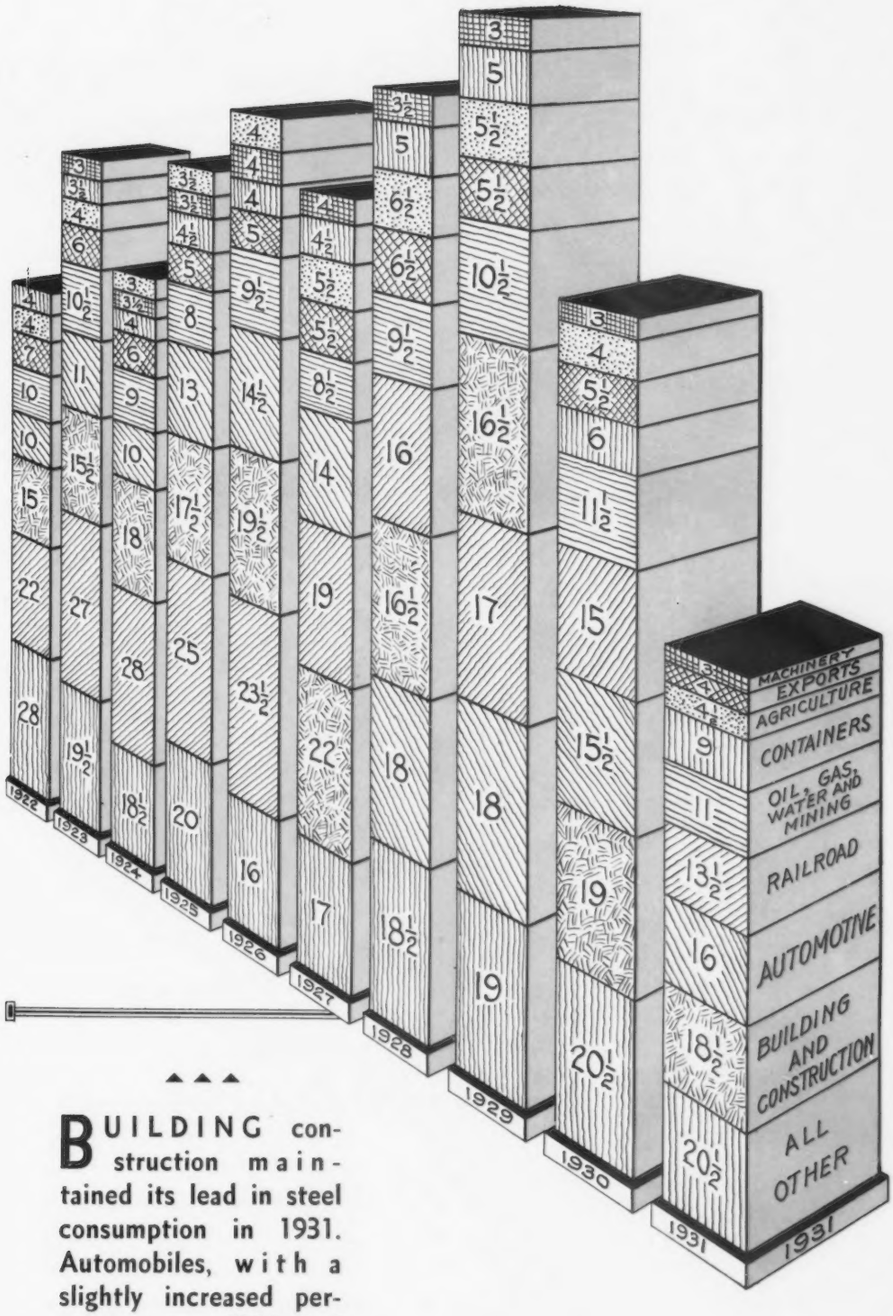
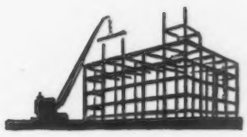


BUILDING construction maintained its lead in steel consumption in 1931. Automobiles, with a slightly increased percentage over 1930, had a larger margin over railroad steel than in that year. A notable increase was made by steel containers, which advanced from 6 per cent to 9 per cent, the largest proportion ever reported for that outlet.



Construction	
Automotive	
Railroads	
Oil, Gas, Water	
Mining, Lumbering	
Agriculture	
Metal containers	
Shipbuilding	
Machinery	
Exports	
All other	
Total	

Distribution of Rolled Steel in 1931, A

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	Heavy Rails	Light Rails	Track Accessories	Pl
Railroads (cars and locomotives)	....	....	1.5	16
Railroads (bldgs. and bridges)	0.6	....	0.1	6
Railroads (track work)	1,031.4	0.7	399.2	1
Fabricators and bldg. contractors	0.1	0.1	....	27
Bldg. hardware and trim	....	....	....	1
Automobiles and parts	0.1	....	0.1	9
Oil, gas and water companies	0.1	....	....	21
Mining and lumbering companies	25.5	5.8	7.9	
Agri. mfrs. and distributers	0.1	....	0.1	
Container makers	....	....	....	
Shipbuilding	....	....	....	8
Boiler and tank mfrs.	....	....	....	26
Machinery and tool makers	0.7	....	0.1	5
Bolt, nut and rivet makers	....	....	0.4	
Electrical manufacturers	....	....	....	2
Concrete reinforcing companies	....	....	....	
Forgers	....	....	0.1	
Pressed and formed metal mfrs.	....	....	....	
Furniture and stove makers	....	....	....	
Jobbers and warehouses	2.1	1.2	7.7	8
Exports	51.7	0.1	4.8	7
Miscellaneous	10.3	0.8	4.6	11
Totals reported	1,122.7	8.7	426.6	1,56
Total year's production	**1,125**	**25**	....	**1,5**

Consumed by Various Industries in 1931

By SIDNEY G. KOON, Associate Editor, THE IRON AGE

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Total production of finished steel is placed at 18,500,000 tons, on the basis of 25,000,000 tons of ingots and the customary conversion factor. Returns from the 51 companies accounted for 18,083,000 tons, or about 97½ per cent of the total for the industry. The distribution of returns from these companies into 22 purchasing channels is shown in the large table at the foot of the sheet.

Declines in production from the preceding year were fairly uniform among the companies, varying for the most part between 35 and 40 per cent. There were a number of divergences, however, and two companies actually made more steel than in 1930.

Tonnage Consumed by Industries

CONSTRUCTION absorbed about 3,450,000 tons of finished steel during the year. This includes the direct reports in the table at the foot of the sheet, and those portions of the indirect reports which went ultimately into buildings. Automobiles absorbed about 2,950,000 tons of steel, figured on the same basis. The railroads took 2,500,000 tons of steel.

Grouping the three major consuming activities, a total of 8,900,000 tons, or 48 per cent, is accounted for. This compares with 49½ per cent in 1930 and with more than 50 per cent in every preceding year since 1922. There has been a fairly steady dispersion in the use of steel since 1926, when the three main activities took 57½ per cent, more and more going to the smaller consuming channels.

Oil, gas, water, mining and lumbering, as a group, took about 2,100,000 tons of steel, accounting for 11 per cent. Containers, including steel barrels and drums and tin cans, stood in fifth position, with about 1,650,000 tons, or 9 per cent. Next came the agricultural industry, taking 800,000 tons, or about 4½ per cent. Exports absorbed about 750,000 tons, or 4 per cent, and machinery took close to 500,000 tons, or nearly 3 per cent. This does not include agricultural machinery.

Our grouping of "all others" in the diagram at the upper left includes shipbuilding, electrical manufacturing, pressed and formed metal, steel furniture, refrigerators, stoves, etc., and a number of miscellaneous items. Of these, shipbuilding took about 200,000 tons, electrical manufacturing more than 300,000 tons, pressed and formed metal more than 300,000 and the furniture group 350,000 tons.

Production of Different Forms of Steel

BARS continued to lead as the largest single tonnage item. The total, including concrete bars, is placed at 3,500,000 tons, a drop of 41 per cent from 1930. Sheets again occupied second position, with a total estimated at 2,575,000 tons, representing a drop from 1930 of nearly 43 per cent. Third place was taken by pipe, with 2,000,000 tons, and indicating a drop of more than 40 per cent from 1930. Structural shapes are placed at 1,975,000 tons, plates at 1,575,000 tons, wire also at 1,575,000 tons, tin plate at 1,550,000 tons, or only 14 per cent below 1930, and rails at 1,150,000 tons.

Steel Taken by Leading Consuming Industries in 1931

(Percentages of Principal Forms)

	Bars	Shapes	Plates	Sheets	Tin Plate	Strips	Pipe	Wire
nstruction	25.3	64.8	21.4	10.7	1.3	5.3	13.2	29.5
tomotive	29.7	0.5	6.2	29.0	0.1	60.3	0.7	6.3
ilroads	6.0	16.5	15.9	3.0	0.1	0.7	3.6	2.4
, Gas, Water } ning, Lumbering }	4.7	4.3	19.1	4.2	1.5	0.7	67.2	4.9
riculture	8.2	1.1	0.8	2.9	0.2	1.3	1.3	18.4
tal containers	0.5	0.1	2.3	7.3	80.9	1.4	0.4	2.8
pbuilding	0.7	2.3	6.2	0.2	0.1	...	1.2	0.4
chinery	7.4	3.0	6.5	0.8	0.1	1.1	1.2	1.6
ports	2.2	5.0	5.0	5.3	9.4	1.2	4.0	3.4
other	15.3	2.4	16.6	36.6	6.3	28.0	7.2	30.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

olled Steel in 1931, According to Shipments of 51 Companies Producing 97 Per Cent of the Year's Output

Amount of Each Form Taken, in Thousands of Gross Tons, by Different Industries

Heavy Rails	Light Rails	Track Accessories	Structural Plates	Structural Shapes	Bars	Hoops, Bands, Cotton Ties	Black Plate for Tinning	All Other Black Plate and Sheets	Tubes and Pipe	Wire Products	Strip Steel	All Other Finished	Billets and Slabs	Sheet and Tin Bars	Wire Rods	Skelp	Tot
....	....	1.5	166.3	71.3	91.6	10.0	....	67.4	29.8	7.0	4.4	114.5	8.0	4.2	0.1	0.1	57
0.6	....	0.1	60.2	224.7	41.3	1.5	0.3	0.3	0.8	13.9	0.1	1.4	....	....	0.1	....	34
1,031.4	0.7	399.2	13.8	3.0	11.8	0.1	....	3.0	0.4	11.5	1.6	36.9	2.6	....	....	....	1,51
0.1	0.1	....	272.6	1,112.5	227.2	6.5	0.1	107.2	30.2	90.1	10.8	14.0	1.3	21.1	13.2	13.6	1,92
....	....	....	12.3	37.2	50.0	14 1	0.9	53.3	1.7	32.8	32.4	9.0	0.2	....	0.2	....	24
0.1	....	0.1	97.1	9.5	754.7	253.1	1.1	729.6	5.9	79.5	571.3	27.6	78.0	178.2	3.2	0.1	2,78
0.1	....	....	219.0	23.2	21.4	3.9	16.9	61.6	948.1	6.3	0.2	13.3	1.3	....	2.5	35.4	1,35
25.5	5.8	7.9	7.8	5.9	6.9	2.4	....	8.4	2.4	10.3	0.3	8.4	....	....	....	....	9
0.1	....	0.1	6.5	13.5	173.6	83.9	0.1	58.1	10.3	251.5	10.9	3.3	10.9	....	48.2	....	67
....	....	....	1.1	0.4	1.7	22.9	1,201.0	156.6	3.4	39.8	10.9	0.3	....	65.1	....	0.1	1,50
....	....	....	89.4	41.0	12.3	0.4	....	3.7	8.0	1.9	....	3.0	0.4	....	....	0.1	16
....	....	....	264.0	29.8	16.4	2.0	0.1	52.5	5.4	0.4	2.2	2.8	5.4	....	....	....	38
0.7	....	0.1	52.5	30.9	122.9	3.9	0.3	4.4	17.9	10.8	9.8	13.9	9.1	....	0.1	0.1	27
....	....	0.4	1.4	0.1	165.2	1.2	....	0.2	1.0	56.2	0.1	5.0	20.6	....	20.8	....	27
....	....	....	25.7	5.8	23.4	1.8	0.2	157.3	30.2	1.4	37.4	5.1	0.2	15.0	3.9	....	30
....	....	....	0.1	2.6	277.9	0.1	....	10.2	....	33.9	0.2	....	3.3	....	0.6	....	32
....	....	0.1	4.0	0.4	89.8	0.1	....	0.1	0.3	0.2	0.1	2.4	34.1	....	....	....	13
....	....	....	5.4	0.1	6.7	2.7	20.8	164.2	1.1	2.9	89.8	0.7	....	10.5	2.2	3.1	31
....	....	....	0.8	0.8	15.1	4.5	3.4	216.4	5.4	57.1	23.4	0.2	....	....	1.2	0.1	32
2.1	1.2	7.7	80.2	150.7	287.0	13.3	37.6	200.5	599.1	506.6	14.6	51.2	12.6	0.2	4.1	16.4	1,98
51.7	0.1	4.8	78.3	95.8	56.5	10.0	143.7	134.3	75.7	50.2	11.9	22.8	1.7	....	10.8	13.4	76
10.3	0.8	4.6	110.0	55.3	252.1	17.9	95.8	364.4	107.6	245.4	156.8	26.1	129.6	118.0	108.4	25.1	1,82
1,122.7	8.7	426.6	1,568.5	1,914.5	2,705.5	456.3	1,522.3	2,553.7	1,884.7	1,509.7	989.2	361.9	319.3	412.3	219.6	107.6	18,08
1,125	25	....	1,575	1,975	3,500	475	1,550	2,575	2,000	1,575	1,025	....	....	....	....	....	18,5

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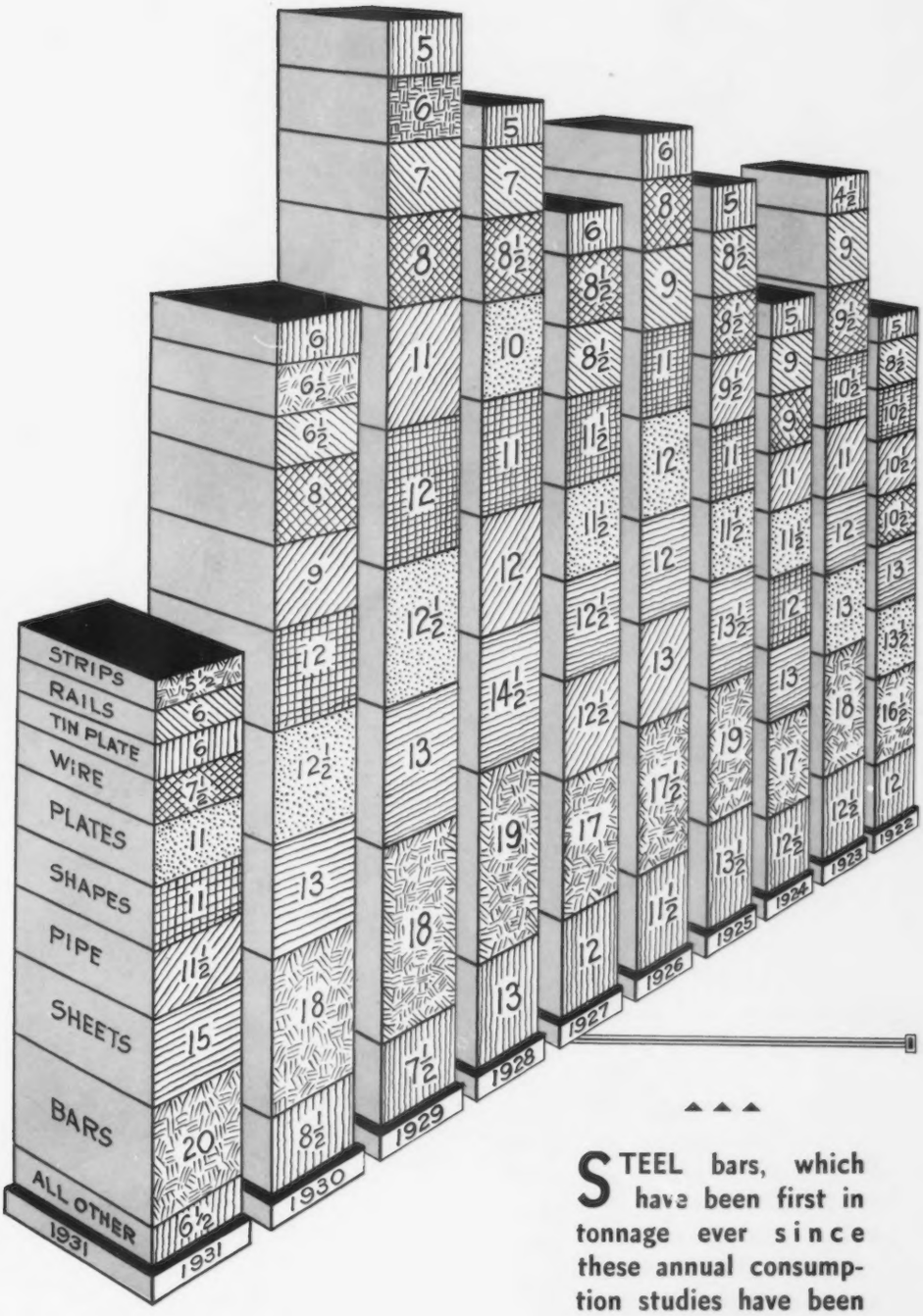
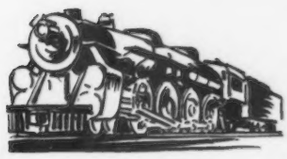


STEEL bars, which have been first in tonnage ever since these annual consumption studies have been made, retained that position in 1931. Second place was held by sheets, with pipe, shapes, plates, wire and tin plate following, in that order. This is the first time tin plate has been in excess of rail tonnage.



put

Skelp	Totals
0.1	576.2
....	345.3
....	1,516.0
13.6	1,920.6
....	244.1
0.1	2,789.1
35.4	1,353.2
....	92.0
....	671.0
0.1	1,503.3
0.1	160.2
....	381.0
0.1	277.4
....	272.4
....	307.4
....	328.9
....	131.6
3.1	310.2
0.1	328.4
16.4	1,985.1
13.4	761.7
25.1	1,828.2
107.6	18,083.1
....	**18,500**

INDUSTRY EXPERIENCES A CALAMITOUS YEAR

By C. E. WRIGHT

▲ ▲ ▲

¶ Steel ingot output declined to 25,000,000 tons, or about 38 per cent below that of 1930, and smallest since 1921.

* * *

¶ Pig iron production about 18,500,000 tons; finished steel total at same figure.

* * *

¶ Finished steel and pig iron prices fell to new lows for many years; scrap lowest on record.

▼ ▼ ▼

THE books have been closed on one of the most calamitous years in American industrial history. Forecasts of early 1931 that the year would be one of "readjustment" from the excesses of 1929 did not envisage the financial chaos in Europe, the widespread closing of banks in the United States, the serious situation affecting our railroads and the growth in the ranks of the unemployed, with their concomitant ills—drastic reduction of consumer purchasing power, the breaking down of the credit machinery, frozen assets and tremendous shrinkage in values of staple commodities and every form of invested capital, all of which brought about a creeping paralysis, from which a distressed world has scarcely begun to recover at the beginning of 1932. With so many dire developments that had not been looked for, 1931 turned out to be much worse than even the most pessimistic would have dared to predict 12 months ago.

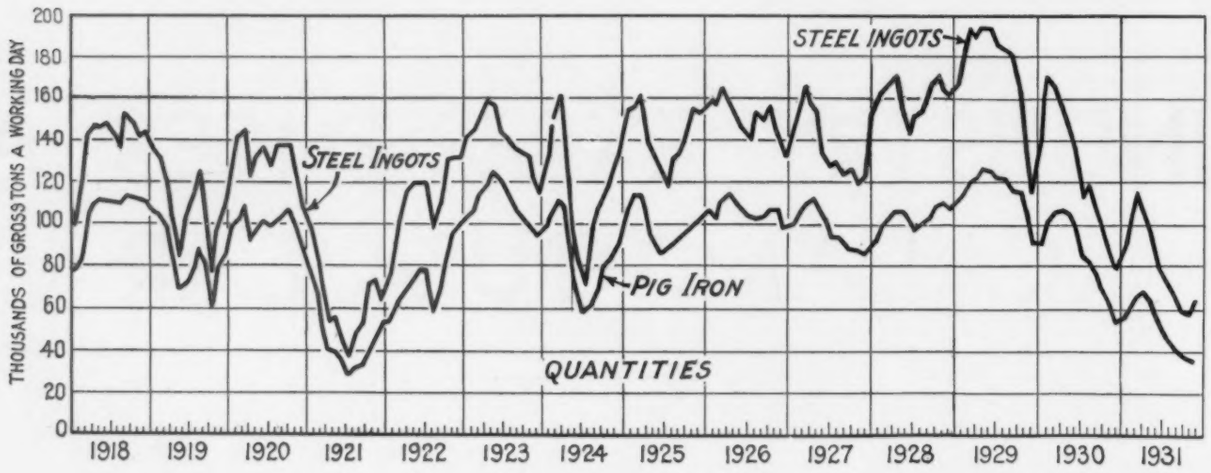
Seldom, if ever, at the dawn of a new year has the future been so difficult to foresee. Not even the most hardy forecaster would venture a confident prediction that genuine prosperity will return in 1932, but there is renewed hope in a gradual amelioration of the world's economic difficulties that will bring a measure of recovery within the coming months.

Both at home and abroad necessity is forcing action to cure, or at least allay, our economic ills. A meeting of the nations of Europe this month may, if it accomplishes nothing else, agree to a postponement of a final settlement of the grievous problem of war debts and reparations to a day when nations will not be harassed by financial impoverishment. In our internal affairs, a partial solution of the railroad crisis, through wage reductions and the more certain increase in funds to come from higher freight rates and loans from the President's Reconstruction Finance Corporation, may prove to be an important step toward recovery, for the widespread effects of low purchasing power among the railroads have been amply demonstrated by the business statistics of 1931.

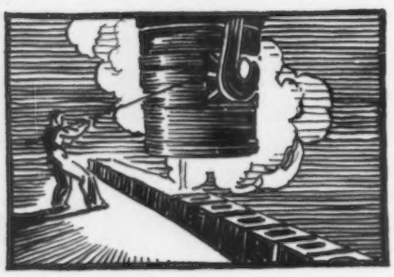
The steel industry ended the old year not only at a record low point in production, but without much business on its books for the first quarter, usually a time of rising demand by the principal steel-consuming industries. Yet, the extreme length of the period of subnormal consumption of steel may have created a reservoir of wants to be filled when betterment in fundamental conditions has restored some degree of confidence.

During the latter six months of 1931 the steel industry operated at an average rate of less than 30 per cent. Its rate for the entire year was fractionally under 38 per cent, based on the December, 1930, capacity figure of the American Iron and Steel Institute of 66,069,570 tons of open-hearth and Bessemer steel. During the year about 4,075,000 tons of new capacity was added, making the present total fully 71,000,000 tons, when electric steel capacity is also included and without allowing for increased capacity through improvements to existing equipment. Therefore, on a basis of an average of 69,000,000 tons capacity for 1931, the ingot output was under 37 per cent.

Similar decreases in activity were to be seen in the major channels of steel consumption. Motor car output declined about 30 per cent from that of 1930, against about a 38 per cent



▲ ▲ ▲ WHILE the gap between steel production and that of pig iron was much narrower, in tons, than in 1928 and 1929, their proportionate relation was much the same. Both went to the lowest levels since 1921.



reduction in steel tonnage; building construction declined in dollar volume of contracts from $5,870,000,000 in 1930 to about $4,000,000,000 in 1931; the railroads were small purchasers all along the line, having taken only 1,032,000 of rails, compared with 1,575,000 in 1930, which was also a poor year for rail laying, and they ordered only 10,880 freight cars for domestic service, or less than half the number bought in either of the two previous worst years in equipment buying, 1919 and 1921, and barely a quarter of their 1930 purchases. Correspondingly reduced buying characterized all of the lesser steel-consuming channels, with the possible exception of road building, which had a fairly active year as a result of measures taken by public authorities to aid the unemployed.

Throughout 1931 hopes for business recovery were raised, only to be thwarted by events which did not cast their shadows before them. There was improvement in the spring, which carried steel ingot operations up to an average of 54.2 per cent in March, from which point business began to take fright from growing bank failures, declines in prices of staple commodities and signs of financial difficulties in Europe. Steel ingot output declined steadily each month to the end of the year, except for a slight rise in November. The Hoover moratorium pronouncement in June raised business hopes at that time, but whatever favorable effect it was expected to have was nullified by the long delay in acceptance of the plan by France. Again in September and October the steel industry looked for a seasonal rise in demands, which failed to eventuate. In fact, October, usually a month of marked activity, had the lowest operations of the year, excepting December.

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Steel Ingot Output About 25,000,000 Tons

STATISTICAL comparisons will naturally be made between 1931 and the previous severe depression year 1921. With December operations at a very low point, it is apparent that the steel output for the past year will not be above 25,000,000 tons, including electric steel ingots as well as those of open-hearth and Bessemer steel, nor above 700,000 tons for steel castings. The total production was below that for any year since 1921, and, with the further exception of 1914, below that of any year since 1911. Finished steel output was about 18,500,000 tons, while the pig iron total, including ferroalloys and charcoal iron, was also about 18,500,000 tons.

With an average engagement of less than 38 per cent of the official rating of steel-making capacity available at the end of 1930, 1931 made a sorry showing against the five preceding years. In 1926 the industry operated at 82½ per cent, in 1927 at 75 per cent, in 1928 at 83 per cent, in 1929 at 87½ per cent and in 1930 at 61 per cent.

Steel ingot production last year rose from a low daily average of 76,136 tons in December, 1930, to 115,139 tons a day in March. After that a continuous decline brought the daily average for October to 58,977 tons, only slightly more than half the March figure. November made a spurt to 63,747 tons a day, but this was cancelled by a further decline in December, the low month of the year.

The 1921 output of all steel ingots was 19,224,084 tons, or about 6,000,000

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Lake Ore Movement Lowest Since 1921

THE movement of Lake Superior iron ore during the 1931 season was, with the exception of that in 1921, the smallest since 1904. The year's total was 23,467,786 gross tons, compared with 21,300,726 tons in 1921. Last year's shipments declined 49.62 per cent from the total of 46,582,982 tons in 1930.

Despite the fact that on Dec. 1, last, the supply of ore on docks and in furnace yards was only 39,232,150 tons, against an average supply for that date of 41,500,000 tons, ore interests estimate that the amount remaining in stock on May 1, next, will be from 8,000,000 to 10,000,000 tons above the normal amount for that date; this estimate is based on expectations of a less-than-normal consumption during the first four months of 1932.

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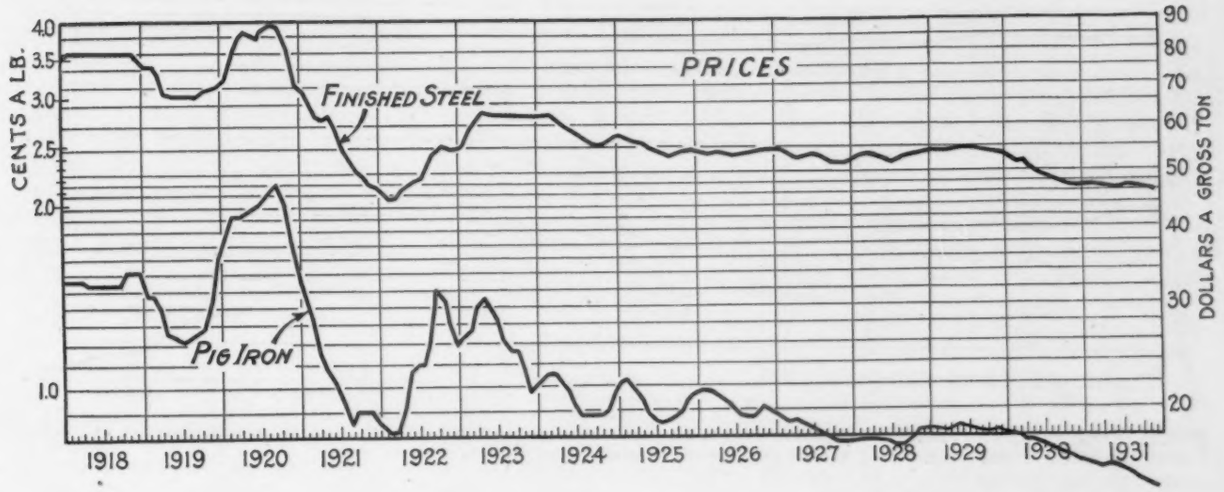

PIG iron prices gave ground much more rapidly during the depression than did steel prices—as is natural, in accordance with economic laws. They are now further apart than ever.

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tons below the 1931 total, but the average operating rate, as related to the then capacity, was nearly the same as in the past year, or 37 per cent as against slightly under 38 per cent in 1931. The course of business, despite the low volume, was quite different, however, in 1921 than in 1931. In the former year the best output record was achieved in January, with a decline only slightly interrupted in May and June, a sharp drop in July, and a rise beginning in August and continuing through November.

Tables elsewhere in this issue give production in detail for both pig iron and steel.

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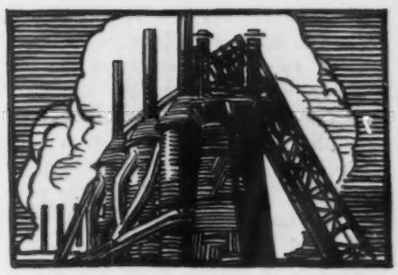
Pig Iron Output Lowest, With One Exception, Since 1908

AFTER falling off nearly 11,000,000 tons in 1930 from the high record of 1929, pig iron output declined 13,000,000 tons further in 1931. The total for the year probably will be about 18,500,000 tons, including all ferroalloys and charcoal iron, or a little above THE IRON AGE figures published on another page of this issue, which cover only coke pig iron and ferromanganese. The 1931 output was the smallest since 1921, which totaled 16,688,126 tons, and, with that year excepted, the smallest since 1908.

Furnaces in blast were reduced in number from 95 on Jan. 1, 1931, to 67 on Dec. 1, 1931. The drop was not continuous, however, as early in the year there was a rise in activity, which brought the number of active furnaces up to the year's maximum of 116 on April 1. The operating rate, which was 51,330 tons a day on Jan. 1, 1931, rose to 67,880 tons on April 1, and during the remainder of the year declined uninterruptedly to 35,810 tons a day on Dec. 1.

The year brought abandonment of additional obsolete blast furnaces, the number of coke furnaces on the potentially active list now being estimated by THE IRON AGE at



290. There has been a steady decline in recent years in the number of furnaces. According to the statistics of the American Iron and Steel Institute, there were 422 at the end of the war in 1918, and the number changed only slightly until 1923, when there were 408, since which time there has been a drop every year.

On Dec. 1, 1930, the furnaces in blast were running at an average daily rate of 560 tons, against 460 tons a day as recently as 1926. On Dec. 1, 1931, however, the rate dropped to 535 tons a day, but this apparently does not mean that the practice of operating the largest furnaces in times of dull business has been abandoned; the explanation is that some furnaces are being run intermittently, blast being on for a few hours each day, thus reducing materially the operating rate through the month.

The number of furnaces in blast at the beginning of each month in 1931, with the current operating rate, are shown in an accompanying table.

The pig iron markets during the year were characterized by increasing accumulation of merchant stocks in the face of declining production. There was also intensified competition between producing districts. THE IRON AGE composite price for pig iron, which stood at $15.90 early in the year, had declined to $14.79 early in

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Merger Movement Ebbed in 1931

MERGERS of companies in the metal-working industries in 1931 were very few, a natural result of the times. The formation of the National Steel Corpn. was completed early in January by ratification of the sale of the Michigan Steel Corpn. to the National company, which now is sixth in size among American steel companies. The Bethlehem Steel Corpn. expanded in its fabricated structural steel and reinforcing bar divisions by absorption of the McClintic-Marshall Corpn., the Hay Foundry & Iron Works, the Levering & Garrigues Co. and the Hedden Iron Construction Co. and the Kalman Steel Co. Other mergers during the year were not of major importance.

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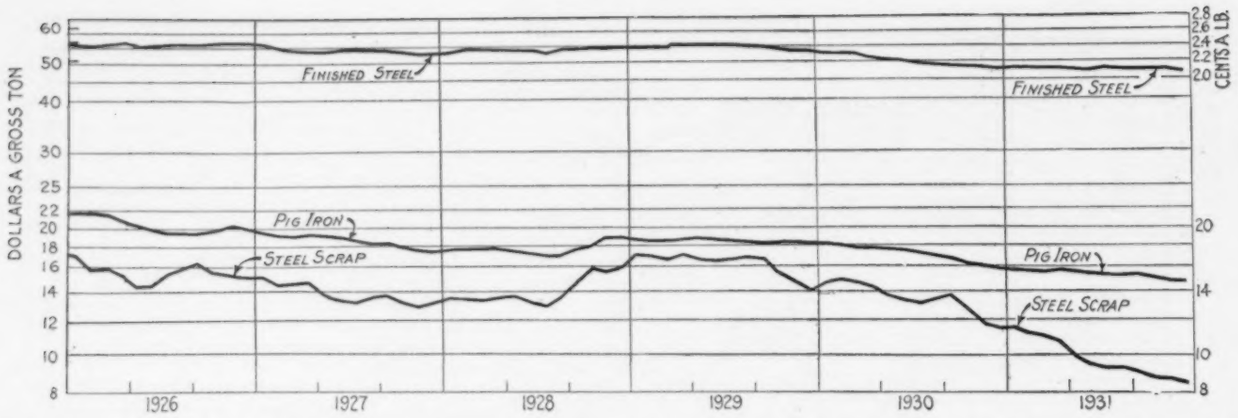

PRICES of steel scrap (THE IRON AGE composite) went to the lowest level ever recorded. Pig iron made the lowest figures in 15 years, and steel, the lowest in nine years. Items nearest the ultimate consumer stood the test best, as usual.

December, with only one slight intervening movement during April to break the drop. Individual sales made quietly to large consumers during the year developed prices considerably under the quoted levels. As an example, a sale of basic iron was made by a Valley merchant interest at a price which figured back to only $12, furnace. Although this was considered a distress sale, it was not more than a dollar under quotations made on one or two occasions by steel companies in the Pittsburgh territory which were anxious to dispose of surplus stocks of pig iron.

Prices in nearly all markets generally lacked strength throughout the year, the only semblance of stability being shown in the Birmingham district during the last half.

Conditions in Merchant Trade

While producers of merchant pig iron, as well as steel companies, curtailed production rather sharply during the last six months of the year, consumption declined even more rapidly, and the year ended with furnace stocks at a high level. Daily production of merchant iron rose to 13,212 tons in May, but had declined to 5753 tons in November, and further blowing out and banking of stacks in December forecast a further decline in output. In most cases steel companies were able to keep their stocks lower than merchant producers, but makers with by-product coke ovens and gas contracts were forced to stay in blast in spite of their accumulating yard stocks. This led a number of companies to seek to dispose of their surplus iron in outside districts at prices approximating production cost or less. However, consumption reached such a low point in the last half of the year that little relief was possible, and buyers declined to make forward commitments, even at bargain prices. Buyers whose requirements were as low as 25 per cent of normal departed from their usual custom of placing contracts in advance. Most of them were able to get immediate deliveries, and thus kept their own stocks at a minimum. Some of them also allowed contracts made earlier in the year at higher prices to run, and purchased their current requirements from other sources at lower prices.

No sustained buying movement of merchant iron developed in any district during the entire year. In the East, Buffalo iron dominated the competition for business in the first few months, but later eastern Pennsylvania producers were just as active. Dutch iron was an important competitive factor at seaboard late in the year, and some Indian iron was moved in through Philadelphia and Boston. In the Pittsburgh and Valley districts production was held in check fairly well, with no more than one merchant operator in production most of the time.

Lake Erie furnaces moved considerable tonnage by water, particularly from Buffalo to the Detroit territory. Silvery iron was also moved from Buffalo as far west as Chicago and Milwaukee, but Cleveland sellers sought inland markets for their surplus rather than in Great Lakes consuming centers. Generally speaking, the water movement was much lighter than in previous years, amounting to scarcely 20 per cent of last year's total in the Buffalo-Chicago exchange. The Chicago and St. Louis markets suffered a heavy decline in consumption, but, with the exception of a little boat iron sent to Muskegon, Mich., they were unable to find any large outlet for their surplus production outside of their natural territory.

Price stability on the part of Southern makers was something of a help to Middle Western producers, the competition having not been nearly so keen as in 1930. In southern Ohio the only consistent activity was shown by the Jackson County silvery makers, but they were out of blast in the later months of the year. Birmingham makers enjoyed a fair amount of pipe tonnage, and were able to keep their stocks down until pipe production in the district encountered the usual year-end slump.

Diversification Practiced

A feature of the year's developments in several consuming districts was the ability of producers to hold prices for local consumption at a higher level than the figures applying on sales in outside territory. Also worthy of comment have been the efforts of a number of producers to diversify their production by widening their range of grades. A Pittsburgh furnace began the manufacture of Bessemer ferrosilicon late in the year, and during the spring a Valley maker produced low phosphorus iron for the first time. The market on charcoal grades was generally dormant, and production entirely ceased on some occasions during the year.

Low Level of Steel Prices Throughout Year

THE steel industry suffered throughout the past year from a low level of selling prices as well as low output. Prices obtained for steel products in the depression year 1921 were generally better than those of 1931. An explanation for this is that the 1920 level was very much higher than the 1929 level, from which the decline has been almost continuous for more than two years. However, the price decline which started late in 1920 made a steady trend to a bottom late in February, 1922, and that low point, represented by THE IRON AGE finished steel composite price of 1.998c. a lb., was $1.08 a net ton below the corresponding figure of 2.052c. a lb. at the end of 1931.

Despite the fact that the percentage engagement of steel-making capacity in the two depression years was approximately the same, the earnings statements of steel companies presented a much worse picture in the past year than in 1921, which is readily explained by the fact that the average price for steel products in the depression year of a decade ago was $8.24 a ton higher than the average for 1931. The 1921 average was 2.532c. a lb., against 2.120c. in 1931.

The decline in THE IRON AGE finished steel composite price during 1931 was only $1.70 a ton, but there was a generally low level throughout the year, the decline in 1930 having amounted to $4.82. The total drop from the 1929 peak of 2.412c. a lb. has been $7.20 a ton. The composite price of 2.052c. at the end of 1931 was the lowest since the first week of April, 1922.

THE IRON AGE finished steel composite is made up of seven items—bars, plates, shapes, sheets, wire, rails and pipe—which together commonly constitute 87 per cent of the finished steel output of the United States. Five of these items were higher at the end of 1931 than at the low point of the 1921-1922 price decline, which came in the last week of February, 1922. Bars, plates and shapes were $3 a net ton higher, rails $3 a gross ton and pipe $6.83 a net ton. Hot-rolled annealed sheets, No. 24 gage, were $10 a ton lower, and plain wire $1 a ton lower.

Efforts were made during the year to raise price levels, the most successful of which was the stabilization program inaugurated by the makers of steel sheets on July 1, which included a reclassification of grades and adoption of new nomenclature and methods of quoting. The higher prices, which became effective at mid-year, were not severely tested until August, as many consumers covered their nearby requirements prior to the advances. The new prices held with considerable firmness through the third quarter and part of the fourth, but at the end of the year many of the prices were back virtually to the levels existing before the rise.

Bars, plates and shapes at the end of the year were $3 a ton below the figure at the start of 1931, but early in January there was an advance of $1, which held until July. Hot-rolled annealed sheets had a net decline of $2 a ton, but were higher at mid-year than at either the beginning or the end. A period of marked weakness in May carried the price of this grade $5 a ton below the year's best quotation. Pipe declined $1.66 a ton on the base sizes in the second quarter, while plain wire and rails went through the year without change.

The highest level of prices for any month was in February, when THE IRON AGE composite stood at 2.142c. a lb. For June the average was down to 2.109c., then a rise to 2.127c. occurred in July, a decline to 2.116c. in August, and that level continued through September, October and November. The figures used are monthly averages.

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Steel Companies' Earnings Low

STEEL companies experienced in 1931 the poorest earnings in at least two decades. Net income for the United States Steel Corpn. for nine months was $17,343,543, but this included special income of $14,321,932, while earnings for the corresponding period of 1930 were $92,099,686, including $7,206,129 of special income. The net income for the full year 1921 was $36,617,017.

The Bethlehem Steel Corpn. had net income of only $1,892,683 in nine months of 1931, against $21,552,406 in the corresponding nine months of 1930 and $10,332,804 in all of 1921. Earnings of other steel companies were in some instances even more seriously reduced.

The dividend on the common stock was cut by United States Steel during the year from $7 per share to $4 and that on Bethlehem common was reduced to $2. Some companies passed their dividends entirely, both on preferred and common stocks.

United States Steel preferred reached a low of 94 early in December, the lowest quoted for that issue since 1908, and the common had a low of 36. Bethlehem preferred dropped to 60 last month and the common to 17¼.

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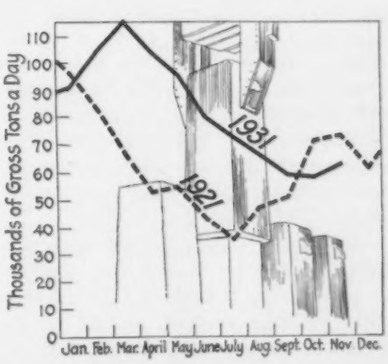
Scrap Prices Declined to the Lowest on Record

REFLECTING the drastically reduced consumption of scrap by open-hearth furnaces, prices of No. 1 heavy melting steel declined during 1931 to the lowest on record. The composite price of THE IRON AGE, being an average of this grade of scrap at Pittsburgh, Chicago and in eastern Pennsylvania, dropped almost without interruption from $11.33 a ton in early January to $8.50 in December, the lowest figure as far back as the compilation of this average goes. Prices on other grades of scrap dropped correspondingly. Some grades, in fact, virtually had no market value during a part of the year, and producers of them in many instances paid to have the material trucked away.



Ingot production in two depression years.

The drop in heavy melting steel from the early quotations of 1931 was $2.83, or more than 24 per cent. The average for the year, $9.78, was $3.67 lower than the 1930 average and $6.50 below the 1929 average. At its lowest price in 1931, heavy melting scrap was just under half of the April, 1929, average of $17.18, which was the peak price of the past three years.

Ratio of Scrap Reduced

Steel companies probably used less scrap in comparison with their ingot production than usual because many of them accumulated large stocks of pig iron, which had to be used up. In a few instances the ratio of scrap to pig iron was increased as an economy measure. Production of scrap by railroads, the automobile industry and other usual sources naturally slowed up in keeping with reduced use of steel, but low production and low consumption balanced each other, and there were no shortages in any of the important consuming districts.

Because of the highly competitive conditions and scarcity of orders, scrap dealers operated on a much smaller profit margin than heretofore. Despite the declining tendency of the market, few sales were made which could be covered far enough into the future to enable the sellers to take advantage of the declining prices. Dealers devoted an increasing amount of attention to merchandising methods and showed more interest in the preparation, segregation

and classification of the various grades. Not many new yards were opened, but existing equipment was improved in many instances to reduce costs. By means of cooperative efforts, the scrap industry was able to strengthen its position with the important consuming and producing groups, such as the steel industry, the railroads and the automobile industry.

Water Movements Increased

Movement of scrap by water increased during the year, notably on the Great Lakes and via the New York State barge canal. Heavy tonnages of No. 1 and No. 2 heavy melting steel were shipped from New York to Buffalo by barge. At the close of canal navigation in the fall, material was stored on barges for shipment in the spring. A large steel company may engage in this movement on its own account in the spring.

A considerable tonnage of cast iron borings was moved by boat from Chicago to Lake Erie points of consumption, and more scrap is being accumulated at Chicago docks for shipment in the spring. Water shipments from

Detroit to Cleveland were not large because of the surplus of material in the Cleveland district, but a considerable tonnage went from Detroit to Fairport, Ohio, for reshipment by rail to Youngstown, Pittsburgh and Wheeling district consumers, and boat shipments from Detroit to Buffalo also were large. Increased rail freight rates on iron and steel scrap, effective this month, are expected to bring about an increase in the water movement during 1932.

Consumers Stocks Kept Low

Although scrap prices were at levels which in former years brought about a good deal of investment buying, there was little of that in the past year. With few exceptions, consumer stocks were kept low. Some of the dealers, particularly those in the Pittsburgh and Valley consuming centers, laid down a good deal of high-grade scrap in their yards and are holding it for an appreciation in prices.

An accompanying table gives a comparison of prices of scrap, pig iron and finished steel. The decline in scrap during the year was more than two-and-a-half times that of pig iron.

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	Steel Scrap (Gross	Pig Iron Ton)	Finished Steel, C. a Lb.
1925 *aver....*	*$17.12*	*$20.58*	*2.465*
1926 *aver....*	*15.48*	*20.42*	*2.439*
1927 *aver....*	*14.00*	*18.55*	*2.357*
1928 *aver....*	*14.29*	*17.67*	*2.352*
January, 1929...	17.02	18.43	2.391
February	16.96	18.38	2.391
March	16.71	18.36	2.391
April	17.18	18.52	2.412
May	16.54	18.70	2.412
June	16.39	18.65	2.412
July	16.60	18.48	2.412
August	16.86	18.38	2.402
September	16.60	18.27	2.394
October	15.58	18.33	2.371
November	14.83	18.36	2.362
December	14.15	18.24	2.362
Year's aver...	*16.28*	*18.43*	*2.393*
January, 1930..	14.65	18.19	2.325
February	14.92	18.02	2.307
March	14.88	17.75	2.312
April	14.30	17.73	2.259
May	13.71	17.60	2.221
June	13.31	17.48	2.207
July	13.08	17.16	2.177
August	13.29	16.90	2.156
September	13.70	16.70	2.146
October	12.77	16.31	2.137
November	11.69	16.21	2.135
December	11.28	15.95	2.124
Year's aver...	*13.48*	*17.17*	*2.209*
January, 1931..	11.30	15.90	2.137
February	11.15	15.80	2.142
March	11.10	15.71	2.134
3-month aver.	*11.18*	*15.80*	*2.138*
April	10.83	15.79	2.128
May	9.94	15.76	2.114
June	9.39	15.62	2.109
3-month aver.	*10.06*	*15.72*	*2.117*
July	9.25	15.56	2.127
August	9.25	15.51	2.116
September	9.12	15.44	2.116
3-month aver.	*9.21*	*15.50*	*2.119*
October	8.78	15.21	2.116
November	8.74	14.97	2.116
December	8.61	14.86	2.088
3-month aver.	*8.71*	*15.01*	*2.107*
Year's aver....	*9.79*	*15.51*	*2.120*

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Exports and Imports of Iron and Steel Lower in 1931

EXPORTS of iron and steel products from the United States underwent a further shrinkage in 1931. The total for the past year was less than half that of 1930 and less than one-third that of 1929, which, however, was the best year since 1920. Exports for 11 months are reported by the Department of Commerce at 908,005 gross tons. The estimate for the full year, in view of the decline in the last quarter, is about 975,000 tons.

Comparing various items with the 1930 figures, it is found that the decline was quite general. Rolled and finished steel shipped abroad in 11 months was only half the tonnage of the previous year; semi-finished steel was somewhat more than half, while tonnages of pig iron and ferromanganese together and iron and steel scrap amounted only to a little more than a third of their 1930 totals. Castings and forgings dropped 42 per cent.

Dividing finished steel into specific products, the following decreases occurred: Bars, 48 per cent; plates, 56 per cent; hot-rolled annealed sheets, 33 per cent; galvanized sheets, 46 per cent; tin plate, 62 per cent; structural shapes, 35 per cent; fabricated structural material, 70 per cent; rails, 68 per cent; wrought pipe, 46 per cent; wire and wire products, 39 per cent.

Some Imports Increased

Imports of iron and steel, estimated for the year at 430,000 tons, the lowest since 1921, declined about 17 per cent from those of 1930. There was a drop of 30 per cent in 1930 from 1929.

Pig iron imports last year were off about 32 per cent, ferroalloys about 52 per cent and scrap 39 per cent. Imports of rolled and finished steel did not decline so sharply as exports, some items, in fact, showing large increases, though the total for all products was 6½ per cent below the 1930 tonnage. Imports of steel bars, for example, totaled 83,724 tons in 11 months, or more than double the 41,134 tons brought in during the corresponding period of 1930. Much of this increase came about through the road building program in the United States, for which bars were used in large quantities because of lower prices.

Declines in finished steel imports occurred in structural shapes, which fell off 34 per cent; sheets, skelp and saw plates, down about 35 per cent, while wrought pipe dropped 23 per cent, though in the latter classification was a gain for welded pipe of 23 per cent. Hoops and bands increased 12 per cent. Wire and wire products, though virtually even with the 1930 total, showed an unusual gain of 107 per cent in one item, barbed wire.

Iron ore imports in 11 months were little more than half of the total in the corresponding period of 1930. Manganese ore, on the other hand, declined less than 6 per cent. Magnesite imports were up almost to the 1930 volume.

Exports of Machinery Decline

Machinery exports in 11 months were valued at $300,600,000, or 38 per cent below the figure for the like period of 1930. As 1930 was the second best year on record for exports

of machinery, the decline here was not so serious as in some other branches of our export trade. However, 1931, based on 11 months' figures, was the poorest year for machinery exports since 1924.

Eleven months' figures showed automobile engine exports less than half of those of the same period in 1930, other internal combustion engines only slightly more than half, electrical machinery and apparatus less than half, excavating machinery less than half, road-making machinery off 61 per cent, mining and quarrying machinery down 29 per cent, oil well machinery less than half, typewriters off 39 per cent, and agricultural implements, the largest item of all, off 45 per cent.

Machine tools showed a decrease of only 3 per cent and other metal-working machinery and parts gained 0.5 per cent. Agricultural implements made up slightly more than 20 per cent of the total machinery exports in 1931 and about 22.5 per cent in 1930.

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Construction Retains Lead in Steel Consumption

THE character of finished steel demand during 1931 did not change materially, as is shown by detailed figures published elsewhere in this issue. Building construction was first in consumption for the second year, with a total of 3,450,000 tons, or 18½ per cent. Automobiles were second, with 2,950,000 tons, or 16 per cent, and railroads, with 2,500,000 tons, or 13½ per cent, came third. All maintained the same positions as in 1930, but with a wider spread between them. The three largest users took only 48 per cent, against 49½ per cent in 1930. A greater diversity of uses in smaller lines appears to be under way.

BUILDING construction of all types in 1931 totaled about $4,000,000,000, against $5,870,000,000 in 1930, a loss of more than 32 per cent in dollar volume, though the decline in square feet of floor space was less, owing to reduced costs of materials and labor. The figures are based on the reports of building contracts published by the F. W. Dodge Corpn., New York, for 37 States, the work for the remainder of the country being estimated.

However, construction held the lead for the second year in total consumption of steel, taking 3,450,000 tons of all forms, or 18½ per cent.

With December figures lacking, it is apparent that the total computed bookings of fabricated structural steel, as gathered by the Bureau of the Census, will not exceed 1,900,000 tons, compared with 2,689,000 tons in all of 1930, a decline of a little under 30 per cent. The actual figure for 11 months on fabricated structural steel was 1,805,600 tons. The best month of the year was September, with 196,800 tons, and November probably was the lowest at 87,200 tons, though it is not certain that the December figure will exceed that of November.

The Dodge total for 37 States in 11 months for all types of construction was $2,955,997,900, against $4,273,679,100 in 1930. The 1931 contracts (11 months) were divided as follows: Non-residential, $1,068,235,900; residential, $775,225,200; public works and utilities, $1,112,536,800.

Non-residential contracts in 11 months showed a loss of 36 per cent from the total for the corresponding period of 1930; the decline in commercial buildings was 49 per cent, while factories showed a loss of 53 per cent. All other non-residential classifications declined except public buildings, which were 49 per cent above the corresponding total for 1930. The drop in construction of public works and utilities, compared with 1930, was 30 per cent. Bridges and highways fell off only 15 per cent, but other engineering work was 42 per cent below the comparable 1930 figure.

Highway construction took a good deal of steel during the year, though there are no reliable estimates of the amount. Highways, in fact, were by far the largest item in the Dodge grouping of public works and utilities construction, making up nearly half of the total. Pipe lines, in dollar volume, fell greatly below their 1930 total. Numerous small lines were laid, some of them taking from 10,000 to 40,000 tons of pipe, but the aggregate of such tonnage did not match with the large amount contracted for in 1930. Pipe line activity centered in the east Texas oil fields, where a large network of pipe was required very suddenly to take care of the flow of oil which had been developed. Practically all of the major oil companies laid lines in that field. It is estimated that 16,500 miles of new pipe line was completed or scheduled for completion during 1931.

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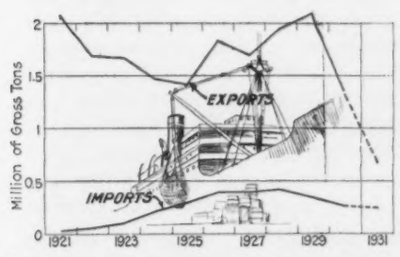
Automobile Industry Had Poorest Year Since 1921

ALTHOUGH production of automobiles and trucks in the United States and Canada in 1931 dropped to the lowest figure since 1921, the automobile industry took second place as a consumer of steel, having used about 16 per cent of the total, or 2,950,000



Exports and imports of finished, rolled steel came much closer together in 1931.

UNITED STATES EXPORTS OF IRON AND STEEL
(Gross Tons)

	1926	1927	1928	1929	1930	1931
Jan.	174,585	215,235	205,766	274,296	225,090	92,745
Feb.	157,187	166,129	185,915	259,711	197,426	91,212
March	169,438	171,094	221,935	270,925	238,333	109,512
April	194,449	192,339	215,184	277,580	208,639	101,081
May	173,418	202,708	267,890	261,516	196,120	91,407
June	159,506	184,364	262,052	247,811	159,392	75,585
July	194,717	190,502	253,336	270,532	131,772	84,466
Aug.	171,588	175,636	287,297	242,856	151,235	73,339
Sept.	182,071	166,352	228,056	222,408	131,211	69,768
Oct.	172,070	170,255	256,870	247,646	131,850	59,335
Nov.	219,830	177,928	256,886	241,829	111,968	59,556
Dec.	198,189	168,427	221,810	215,242	101,988	.....
	2,167,048	2,180,969	2,862,997	3,032,352	1,985,025	*975,000

*Estimated, as to December.

gross tons, as compiled by THE IRON AGE from detailed reports of steel companies.

The total output of passenger cars and trucks in the United States and Canada last year, with December estimated, was 2,460,000, of which 2,040,000 were passenger cars and 420,000 were trucks. These figures are based on the combined tabulations of the United States Bureau of the Census and the Dominion Bureau of Statistics. The 1921 output in both countries was 1,682,365 units. It was not until 1923, however, that the automobile industry arrived at its greatest period of expansion.

Production figures for a decade illustrate this striking growth and are also indicative of the severity of the decline during the past year. The totals by years follow:

1922.....	2,646,229	1927.....	3,580,380
1923.....	4,180,450	1928.....	4,601,141
1924.....	3,737,786	1929.....	5,621,709
1925.....	4,427,800	1930.....	3,510,178
1926.....	4,505,661	*1931.....	2,460,000

*Estimated.

Trend Followed Usual Course

Despite the low 1931 production, the trend throughout the year followed its usual course. About two-thirds of the total number of cars and trucks were produced in the first six months. April was the month of largest output, as it was in 1930. In 1928 the peak output came in August, and in 1924 March was the top month, but in other years, beginning with 1923, the peak of production came in either April or May. In April, the best month of last year, 354,098 cars and trucks were manufactured.

Although 1931 output of all cars fell about 30 per cent below the 1930 total, the drop was less in trucks than in passenger cars. Seeing in the truck field an opportunity to resuscitate fading profits, many passenger car companies gave increased attention to the manufacture of light-duty trucks and commercial cars. Chevrolet put itself in a better position to challenge Ford's leadership by establishing a truck body plant at Indianapolis and branch truck assembly stations in various parts of the country. Dodge, Willys-Overland, Studebaker-Pierce-Arrow and Reo also entered this market in vigorous fashion.

Of outstanding interest in the industry was the battle for leadership in the low-price class between Ford and Chevrolet, the latter attaining supremacy in passenger car sales for the first time since the Ford Model A was put on the market. However, Ford held first place in commercial car sales. From a high mark of 42 per cent of the industry's total assemblies in 1930, Ford dropped slightly under 30 per cent the past year. General Motors, on the other hand, showed a sharp increase, reaching a high point of 43 per cent. However, the Ford plants were almost idle during five months of the year while a change-over to a new car was being made.

Second only in interest to the Ford-Chevrolet competition was the spurt of Plymouth, which in mid-year made its first serious bid for a share of the low-price business. With heavy production in July, August and September, Plymouth shipped 102,110 cars in the first 10 months of the year, compared with 70,207 in the same period of 1930. Sharing the spotlight with Plymouth was Auburn, which sold two-and-a-half times as many cars in 1931 as in 1930 and made the industry's best financial showing.

Many New Mechanical Changes

In mechanical developments the year was notable. Free wheeling made such rapid strides that it is now standard equipment on almost all cars. With it has come some form of synchronized gear shift to ease the effort of driving. It also has compelled the adoption of heavier brakes, many of which are now of combination cast iron and steel construction.

Of special interest to the steel trade is the wider use of all-steel bodies and all-steel wheels, the latter now constituting about 90 per cent of the total wheel output. Concurrent with these developments and in some measure responsible for them is the greater application of welding.

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Railroads Conspicuously Poor Buyers in 1931

RAILROADS took 13½ per cent of the total finished steel production of 1931, compared with 15 per cent in 1930 and 17 per cent in 1929, and continued in third place as a steel consumer. Although the relative position of the railroads in steel consumption was not changed, their 1931 purchases of cars and locomotives were the smallest in many years.

Records going back to 1915 disclose only two years in which equipment purchases even approached the low point of 1931. These years were 1919 and 1921, the former with a total of 22,062 cars ordered for domestic service and the latter with 23,346. The 1931 number was only 10,880. Even the addition of 3807 cars ordered for use in Canada and 151 for export brings the total only to 14,838. The annual compilation of statistics by *Railway Age* shows that only 13,205 cars were built during the year for domestic service, while the report of the American Railway Association gives 12,707 as the number of cars installed in service.

The probable explanation for the fact that the railroads continued in third place as steel purchasers, regardless of the small amount of equipment buying, is that a considerable volume of bridge construction was engaged in during 1931. The steel requirements of the railroads for repair work were conspicuously low; many of their car and locomotive shops were virtually shut down for months at a time; replacement of rails was less than usual, and many roads carried over to the end of 1931 some of the rails they bought late in 1930 for use last year.

May Continue to Be Poor Buyers

In its review of a year ago, THE IRON AGE said: "A belief is gaining ground that the railroads may be a less important factor during the next year or two in the purchase of steel and other commodities pending ad-

Railroad Equipment Orders Very Low

(Figures compiled by Railway Age)

Equipment Ordered	
Freight cars for domestic service..	10,880
Freight cars for use in Canada....	3,807
Freight cars for export.....	151
Total	14,838
Locomotives for domestic service..	235
Locomotives for use in Canada...	2
Locomotives for export.....	28
Total	265
Passenger cars for domestic service	11
Passenger cars for use in Canada..	11
Passenger cars for export.....	21
Total	43
Equipment Built	
Freight cars for domestic service.	13,205
Freight cars for service in Canada	4,633
Freight cars for export.....	409
Locomotives for domestic service..	181
Locomotives for service in Canada.	24
Locomotives for export.....	17
Passenger cars for domestic service	198
Passenger cars for service in Canada	66
Passenger cars for export.....	21

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justments, legislative or otherwise, which will assure their economic future." This was written without foreknowledge of the serious financial plight in which the railroads found themselves during the latter half of 1931. There is no reason to change this statement with respect to 1932, except that they may buy more than they did in the past year, but they will scarcely become the good customers of the steel and equipment companies that they once were until their status in the economic scheme has become more secure. Legislation toward this end may be enacted in the present session of Congress. R. H. Aishton, president, American Railway Association, ascribes the condition of the carriers to two remediable situations:

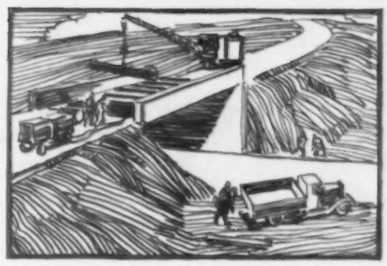
1. Defects in the present regulatory system which prevents the railroads from building up their reserves in normal times so as to enable them to be prepared to face conditions such as now exist, for no system can be termed sound which encourages reductions in rates in prosperous times and necessitates increases in time of economic depression.

2. Lack of appropriate regulation, so far as interstate commerce is concerned, of the various agencies of transportation designed to bring about a complete and coordinated system of transportation embracing all land and water agencies.

Traffic Greatly Decreased

Not only have the railroads been financially unable to buy their usual quota, but the decrease in traffic has made it unnecessary for them to add to their facilities. Preliminary estimates of the American Railway Association are that loading of revenue freight in 1931 totaled 37,250,000 cars, a reduction of 8,630,000 cars, or 18.8 per cent, from the 1930 total and 15,577,900 cars, or 29.5 per cent, from 1929. Measured in net ton miles, the 1931 freight volume is estimated at 340,000,000,000, a reduction of 19.5 per cent from 1930 and 30.9 per cent from 1929. Passenger traffic was the smallest in 27 years.

Ownership of freight cars by Class I railroads on Dec. 1, 1931, was approximately 2,205,062 cars, or 4.3 per cent less than on Dec. 1, 1923, but meanwhile the average carrying capacity per car has increased 3.41 tons. The present number of cars is a decrease of 159,610 units from the highest figure, established in September, 1925. The number of locomotives on Dec. 1, last, was 54,861, a decline of 10,018, or 15.4 per cent compared with the same date in 1923, but the average traction power increased 17.2 per cent per locomotive. Although many cars and locomotives are believed to be in need of repairs, the need for additional equipment will be small until such time as traffic has considerably increased. Thus, it would appear that the outlook for a marked gain in railroad equipment buying during at least the first half of 1932 is not encouraging.



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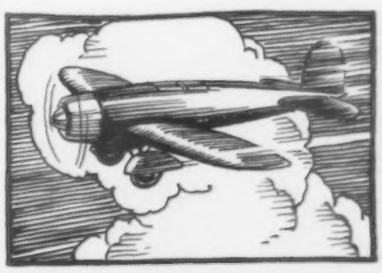
CANADIAN INDUSTRY ALSO SERIOUSLY DEPRESSED

CANADIAN industry during 1931 exhibited very much the same characteristics as that of the United States. Primary producers in some instances were forced to curtail output to the lowest levels since pre-war days, while even the most favorably situated had the poorest year since 1925. The iron and steel industry of the Dominion was badly affected. Not only did the domestic demand fall off, but exports almost vanished.

The revised tariff, announced by the Bennett government early in the year, resulted in a reduction of imports. In the final quarter of the year the discount on Canadian funds placed the United States at a further disadvantage of 10 to 25 per cent in trade with its neighbor country. The result was to swing more business to Great Britain. The flow of steel from across the Atlantic during the late months of 1931 was greater than that from the United States.

One effect of the higher tariffs was to bring a large number of new plants to the Dominion. It is estimated that there were fully 2000 such, the majority of them branches of American plants.



A unique feature of the 1931 Canadian record is that pig iron prices, though declining in the United States, remained unchanged in the Dominion throughout the year.

The accompanying table shows the production of pig iron, ferroalloys, steel ingots and steel castings in Canada for each year from 1923 to 1931 inclusive.

(In Gross Tons)

	Pig Iron	Ferroalloys	Ingots	Castings
1923	880,018	28,961	839,710	45,060
1924	593,024	26,400	625,175	25,515
1925	570,397	25,709	733,855	18,840
1926	737,503	57,416	745,550	33,338
1927	707,697	56,230	867,928	39,710
1928	1,037,727	44,882	1,190,001	44,718
1929	1,090,244	80,010	1,309,543	70,145
1930	747,448	66,494	957,430	54,312
*1931	451,332	50,624	664,826	37,055

*December estimated.

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Views of Industrial Leaders on Prospects for 1932

James A. Farrell, president, United States Steel Corpn.: "The steel industry has had its share of adversity, but that does not mean the steel industry cannot right itself."

Gerard Swope, president, General Electric Co.: "We look forward to 1932 and succeeding years with confidence. We think that conditions in our country in 1932 should be at least as good as in 1931, after which we can look forward to a gradual increase in the electrical manufacturing business."

F. A. Merrick, president, Westinghouse Electric & Mfg. Co.: "Industry will come out of the depression more fundamentally organized than ever before. This is the only way out. No nostrums will serve."

Alfred Kaufman, president, Link-Belt Co.: "There is no magic formula by which miracles may come to pass. Business will not change overnight, but in time it will be better."

CONFIDENCE IN STABILITY OF

By DR. LEWIS H. HANEY
Director, New York University Bureau of Business Research

JUST as the excesses of the boom of 1929 were most marked in finance, so the great problem of today lies in money and credit. Supplies of raw materials and manufactured products are plentiful. The difficulty lies in the fact that the whole machinery of trade, national and international, has been thrown out of gear by great changes in the medium of exchange, money. First, we had great inflation, which piled masses of credit on the monetary base, thus enabling everyone to go into debt. Then came rapid deflation, bringing their debts home to the debtors. So many are now in debt or involved in commitments made at inflated prices that they have not the purchasing power which would enable them to avail themselves of the existing commodity supplies. If everybody be in debt to everybody else, it might seem possible to cancel the whole debt structure. Unfortunately, however, we have no great clearing house to effect such a settlement and we, therefore, depend upon the slow process of liquidation to restore the general solvency and develop a new basis of purchasing power.

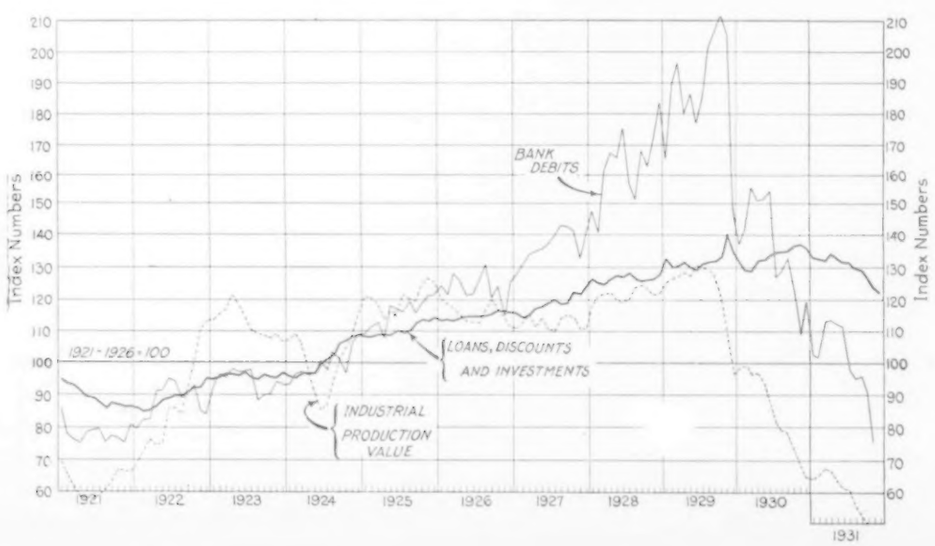
We must remember, too, that lower prices increase the purchasing power not only of money, but also of those solvent persons who have money. This purchasing power they will exercise as soon as prices become stabilized.

Gold is the basis of the world's leading monetary systems, and the immediate importance of this basis increases as credit decreases. The gold problem is, therefore, now among the most crucial. We find maladjustment in the world's gold supply remaining as one of the outstanding difficulties, and one which has been forcefully illustrated by the inability of England and Japan to maintain the gold value of their standard monies. The United States and France still hold so much of the world's gold supply that most other countries do not have enough to maintain their currencies on a gold basis.

Balancing National Budgets Found Difficult

PRIMARILY the trouble in England and Japan has been inability to maintain the balance of trade and to balance budgets. Starting with all too small a gold "cover," they have been forced to ship out gold until finally they have found themselves unable to maintain the pound or the yen on the old basis. Lacking a definite basis for estimating how much gold they can retain as a monetary base, these nations have suspended payment and prohibited exports of the precious metal.

They have endeavored to make a virtue of their necessity and to emphasize the temporary advantages which have followed the depreciation in their exchanges. For one thing, the decline in sterling and yen exchange has amounted to a sort of protective tariff for the countries involved, discouraging imports. This effect they have sought to increase by actually adopting increased protective tariffs. For another thing, the decline in exchange tends to stimulate exports temporarily, since English and Japanese exporters can get dollars or other undepreciated money, exchange them for depreciated pounds or yen, and use the latter for purchases in their own countries at price levels which have changed relatively little. The whole thing depends upon



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VALUE of industrial production, now well below that of 1921, dropped nearly 30 per cent in the past 12 months, whereas total of loans, discounts and investments fell only some 10 per cent.

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MONEY IS ONE GREAT NEED

DR. HANEY, whose almost weekly analyses of industrial economic movements have featured these columns for some years, does not go along with THE IRON AGE in urging a release of the pressure for deflation. If everybody be in debt to everybody else, it might seem possible, he says, to cancel the whole debt structure, but there is no clearing house to bring about such a settlement. Hence, he believes, deflation must go on.

He holds that the finance and credit corporations proposed cannot essentially change the situation, that secondary credit will still be credit. Reviewing briefly the great progress already made in deflation, he nevertheless considers that loans and investments of banks are out of all proportion to the value or the volume of business and suggests that one of the great problems ahead of us is the liquidation of over-expansion of invested capital, a matter that will involve much reduction in equities.

His thesis in fine is that inflation before there is substantially complete deflation would bring on uncertainty as to the value of money.

the maintenance of their domestic prices, however, and as these must tend to rise in due course the exporters' advantage will in time probably disappear.

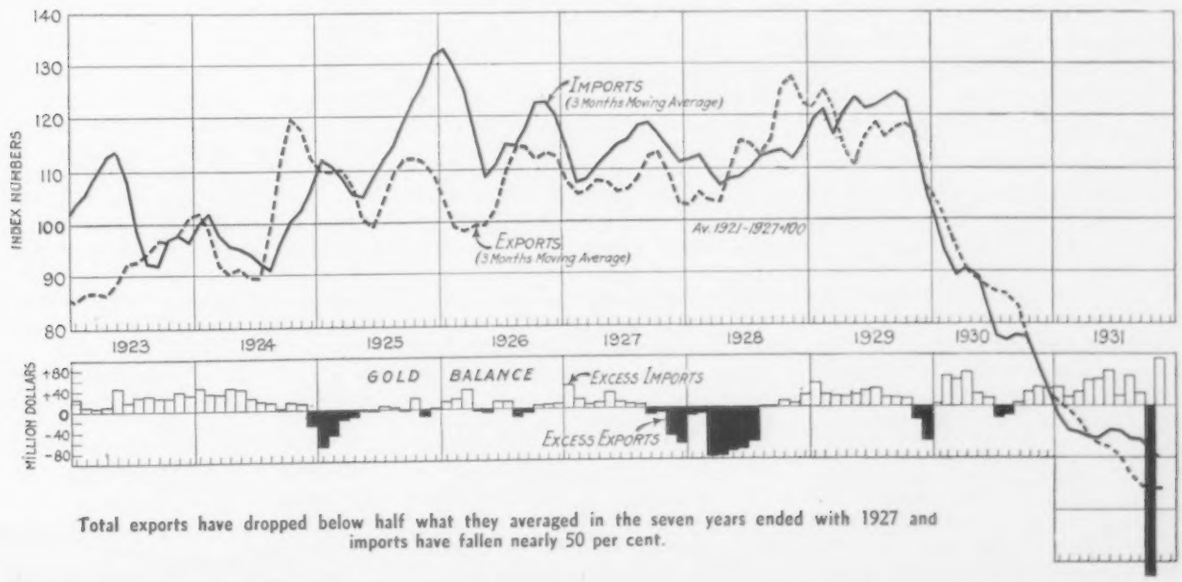
Finally, there will probably come a revaluation of the pound and of the yen in terms of gold, which will amount to a sort of tax on the English and Japanese peoples or others who hold their currencies.

Meanwhile, there is disruption in world trade because of fluctuating exchange rates, particularly in sterling, which results immediately from the maldistribution of gold, although more fundamental factors lie back of that maldistribution.

As a result, nationalism is running riot. International trade tends to be reduced to barter, and currency depreciation and protective tariff are being reduced to an absurdity. When everyone does it—that is, adopts inflation and high tariff—it benefits no one. If, finally, international trade is to become extinct, the problem of handling excess capacities in exporting countries and the lack of economy resulting from the attempt of each country to produce everything that it requires will be so great that the world cannot tolerate them. Such a situation would represent a return to conditions found only in the Middle Ages.

Deflation in Its Late Stages

HOW about the United States? We have more than enough gold. We certainly have tariff protection. We can balance our budget. Our balance of trade is still favorable—such



Total exports have dropped below half what they averaged in the seven years ended with 1927 and imports have fallen nearly 50 per cent.

as it is. Are we to participate in the riot of "managed currencies" and high protection? It is not too late to avoid it, and the great opportunity of this nation now lies in leading a movement toward international sanity in these respects.

What, then, is the internal business situation in this country? We find ourselves at the beginning of 1932 in the late stages of a great process of deflation. Speculative credit, as measured by "brokers' loans," has been completely deflated, thus correcting the greatest and most characteristic inflationary element of 1929. Many commodity prices are so clearly below any possible cost of production that they must be considered to be on a long-time investment basis. It seems that in many cases wages are well deflated. Much progress is being made toward efficiency and economy in production. Unquestionably the inflated standards of living of 1929 are in process of readjustment to the realities.

But the maladjustments are not completely corrected, nor has the inflation of past years been completely deflated. For example, we find a notably incomplete liquidation in the case of that large amount of bank credit which is tied up in overvalued investments and in frozen loans on securities. The total loans and investments of the member banks are out of all proportion to the value or the volume of business. The ratio of such loans and investments to the total deposits of the banks is just about as great as it was at the peak in 1929. Nor can any government receivership, carried out through a "finance corporation," essentially change the situation. "Secondary" (reserve) credit or government credit are still but credit.

Also we find some commodity prices and the wages of some labor groups so out of line with the general levels as to warrant the conclusion that they retain considerable inflation.

Excess Capacity Remains Burdensome

THEN, again, there is the problem of the large stocks of certain raw materials, of which cotton is one of the most striking manifestations. In several important instances, production may remain below consumption for many months before a balance can be restored. Extensions of credit for "withholding" such surplus supplies only weaken the general position.

Back of all this lies the existence of great excess capacity and great over-capitalization. These were built up during the period of inflation when money was abnormally easy. As the prices of products decline, as standards of living contract, and as export trade falls to the vanishing point, this over-capacity and over-capitalization become more and more burdensome. One of the great problems which lies ahead is the problem of liquidating the over-expansion of invested capital. This will doubtless involve much reduction in equities.

I have referred to standards of living. It is not the intention to argue that living standards must be sharply lowered. It does seem, however, that the American standard of living of 1929 was affected by the general inflation and was maintained by an undue amount of buying on the installment plan. For example, it hardly seems reasonable to believe that every American farmer and laborer must own and operate an automobile. Probably the trouble with the American standard of living has been that it has not been based on sound standards. As commodity prices decline, and with them the cost of living, more of the things which contribute to a healthy and happy life will be available and possibly less of the jazzy and Jonesy things which seemed so important in 1929.

Doubts Inflation Yet Desirable

BUT if there must be further deflation, the question arises, how far must the general deflation go? Will not everybody be ruined before the process is complete? There has been 100 per cent deflation in some cases, 90 per cent in others, 50 per cent in still others. Many persons have the idea that it may be well to stop with a general average of, say, 75 per cent deflation, which would mean further deflation in some cases and perhaps a "little inflation" in others. They argue that, on the homeopathic principle, we should seek to remedy extreme deflation by administering just a little inflation.

Concerning this argument, two questions arise: The first is, could the injection of inflation at this time be made to take effect and work a stabilization cure? Obviously debts are not settled by inflation. Frozen loans or over-valued investments would not be changed unless for the worse. Above all, a new element of uncertainty would be injected—uncertainty as to the value of money. Not only would all thrifty persons who have money, and all creditors and bond holders, be placed in jeopardy, but all business transactions would be slowed up because of the uncertainty concerning the medium of exchange.

The second question is, would not a recurrence of the inflation fever be the inevitable result of the injection of sufficient inflation to have any effect? The present writer knows of no experience with inflation which justifies the hope that, once started, it can be stopped until it has run its usual course.

We greatly need to be reminded that the much abused process of deflation is essentially a process of liquidation and elimination of past inflation. If it had not been for inflation there would have been no deflation. It is as a result of going into debt, and making commitments which now show paper losses, that the present situation has arisen. *As long as these debts and losses remain unsettled, the debtor cannot buy, nor can the creditor.* The result is a sort of universal "still-haltung." Undoubtedly many creditors may well make readjustments in their claims, and a large amount of refunding and extension of debts is possible and desirable. Only by some equitable settlement, however, made on the basis of a sound medium of exchange, can ultimate stabilization be achieved.

The Way Out Lies in Money and Banking

THE way out of the depression seems less gloomy when we remember that the level of prices makes little difference, if only the prices of various commodities and labor are in some workable proportion to one another. A smaller amount of money and credit may move the same amount of commodities and services just as well and just as effectively as a larger amount. The chief desideratum is that the price level be reasonably stable so that business plans and payments can be made with some degree of certainty.

The debts which so burden us are practically all payable in money. Now that prices are so largely readjusted, the chief problem is coming to be that of the value of money. In their efforts to escape obligations, debtors and those having paper losses are dallying with the idea of inflation. They appear to forget that everything nowadays is bought and sold for money and that only when the monetary unit is *definite* can buying and selling proceed and money circulate freely. They forget that in the long run the best interests of business require a stabilization of prices, which can be maintained only when prices are allowed to adjust themselves to a definite, standard monetary base, in free markets. The weakness in the bond market has undoubtedly been due in part to doubts concerning the value of money.

We cannot hurt the thrifty without hurting business in general.

(*Concluded on advertising page* 64)

WATER MOVEMENTS AFFECT COMPETITION

ONE can draw an imaginary picture of considerable changes to come in competitive markets through further developments in transportation of steel and other materials by water. Detroit mills might, perhaps, invade Atlantic Coast markets; in fact, they have already shipped by water as far as Utica, N. Y.; they have also solicited business in and near Chicago. Valley mills may have egress by water to Ohio and Mississippi valley markets if canalization of unnavigable rivers in Ohio is authorized, while a projected canal to Lake Erie would permit Valley mills to ship by water to Detroit and elsewhere on the Great Lakes. Chicago, Buffalo and Cleveland ship steel to Detroit; Lake Erie ports have shipped pig iron to Chicago, and other cross movements, perhaps otherwise not feasible, have been accomplished via water routes.

WATER shipments of pig iron, steel and scrap have undoubtedly increased in some directions during the past year in proportion to the total volume of materials transported. In the highly competitive Detroit district iron and steel companies have used the Great Lakes to deliver their products to a greater extent than ever before; plans for the further improvement of facilities for the movement of iron and steel products by river out of the Pittsburgh district were carried on during the past year with no abatement; scrap has moved freely by boat from Detroit to Buffalo and from the New York district by the State barge canal to Buffalo; a campaign has been carried on by the Beaver, Mahoning and Shenango Rivers' Improvement Association, with headquarters in Youngstown, to bring about the canalization of these waterways; pig iron was moved by rail and water during a greater part of the year from Alabama furnaces to North Atlantic Coast ports; pig iron movement by barge from Buffalo to New England and New York and New Jersey consuming points has continued, though in reduced volume, and the blast furnace at Everett, Mass., shipped nearly 60,000 tons of pig iron in 1931 to New York, Philadelphia and other seaboard points.

Other Waterway Projects Proposed

All of these developments point to even greater use of waterways in future whenever substantial savings in freight rates can thus be effected. Many consuming plants situated on tidewater or on the Great Lakes or on navigable rivers have recognized the probable permanence of water movement by improving dock facilities for the unloading of cargoes. The competition which the greater use of waterways, together with increased utilization of truck for long-distance hauling, has given the railroads is emphasized in all of the appeals of the carriers for legislation that will safeguard their future.

Aside from the St. Lawrence River project, consummation of which is probably some time away, one of the principal waterway proposals is that fostered by interests in the Beaver, Mahoning and Shenango valleys. Although an outlet to the Ohio River is the first goal of the improvement association, a plan to build a canal to Lake Erie has not been lost sight of. Canalization of the three rivers by the construction of locks and dams would release a potential river traffic of 25,000,000 tons a year, a large part of which would consist of iron and steel products and materials used in their making, particularly coal.

Canalization of other rivers in the upper Ohio Valley was given impetus during the year by various agencies, and a number of projects were undertaken. Construction of locks and dams in the Kanawha River in West Virginia was continued, and some work was undertaken on the Youghiogheny River in western Pennsylvania. Interest was also continued in the improvement of the Kiskiminetas and Conemaugh rivers, tributary to the Allegheny River, and navigability of the latter stream was extended. Construction of the Pymatuming dam on the upper Shenango River was begun, a project that is expected to assure a steady flow of water in the upper Ohio Valley during the summer.

Pittsburgh River Shipments Declined

Total movements of iron and steel products on the Ohio, Monongahela and Allegheny rivers within the jurisdiction of the Pittsburgh office of the United States Corps of Engineers during 1931 was approximately 1,214,000 tons, November and December shipments being estimated. While this was a sharp drop from the 2,419,931 tons handled in 1930, the percentage decline in comparison with total iron and steel produced in the Pittsburgh district was probably not so great. Of the tonnage moved in 1931, the Ohio River contributed 725,000 tons, the Monongahela River 465,000 tons, and the Allegheny River 24,000 tons. The figures include up and down river shipments, and a large tonnage of inter-plant materials.

While no statistics on river shipments by products are available, line pipe was again a leading item in the movement of finished steel products.

Much of this material was moved by barge as far as Memphis, Tenn., and was there re-shipped by rail to the Mid-Continent oil fields. Pittsburgh district steel companies continued to use their warehouses on the Ohio and Mississippi Rivers for distribution of steel over a wide territory in the South and Southwest, and during the year the Jones & Laughlin Steel Corpn. extended its chain of warehouses by the purchase of a modern distributing plant in New Orleans.

The increase in short-haul freight rates affected the movement of steel by barges, and undoubtedly added some tonnage to the rivers. However, the actual loss of steel tonnage by the railroads was not so great as it might have been if production had been at a high rate, as small shipments are not as well adapted to water movement as heavier tonnage. In a year of normal production the effect of higher freight rates will be better demonstrated.

Automobile Steel Shipped by Water

Detroit has been the center of a striking expansion in the utilization of water for saving transportation costs. The Illinois Steel Co. has been shipping steel from Chicago to Detroit by boat, contracting for this transportation with Lake carriers, which unload their cargoes at Ecorse, Mich., from which point the steel is switched by rail to various automobile plants. The Carnegie Steel Co. has been resorting to a combination of rail and water, sending steel out of Pittsburgh by rail to Conneaut, Ohio, where it is transferred to Lake freighters for Detroit delivery. The Bethlehem Steel Corpn. and the Republic Steel Corpn. have been shipping steel from Buffalo to Detroit by water, the former operating its own boats as well as using commercial lines.

Bethlehem, incidentally, was one of the largest buyers of scrap in the Detroit market during the year, moving the material to its Lackawanna plant by water. An innovation was the movement late in the Lake navigation season of 18,000 tons of cast iron borings from Chicago to Buffalo by boat.

Other steel companies have been forced to resort to water transportation to meet competition. The Otis Steel Co. has utilized boats for many of its shipments to Detroit. The River Raisin at Monroe, Mich., has been dredged to provide a channel for the Newton Steel Co. to receive sheet bars from Cleveland or other points and ship finished steel to consuming markets. The Michigan Steel division of the National Steel Corpn. made a shipment of full-finished sheets from its plant at Ecorse, Mich., to General Motors factories at Oshawa, Ont.

A recent shipment of strip steel from the Great Lakes Steel Corpn. at Ecorse to Utica, N. Y., by an all-water route caused much comment in steel circles. The steel mills at Detroit claim that they can ship steel economically to the Atlantic Seaboard, using the Great Lakes, New York State barge canal and Hudson River, although they have not yet attempted to invade the coast markets. The Great Lakes plant is on the Detroit River so that material can be dispatched to customers by water whenever that method of delivery is most advantageous.

Pig Iron Stored for Winter

There has been some effort on the part of steel users at Detroit to save $2 to $3 a ton freight by bringing in material, especially forging stock, by water in sufficient quantities to tide them over a considerable portion of the winter when the Lakes are closed to navigation. This is not always feasible, however, on account of uncertainty regarding production requirements, the possibility of a declining steel market and the risk of a change in steel specifications by the engineering departments of the consumer companies.

These factors do not affect pig iron, which is shipped by water from the Hanna furnaces at Buffalo to the gray iron foundry of the Chevrolet Motor Co. at Saginaw, Mich., to be stocked in large enough volume to meet operating needs during the winter months. This practice was begun two years ago, when the Chevrolet company built a dock at its foundry for the purpose of receiving water shipments of various materials, including pig iron. A stock ranging from 50,000 to 75,000 tons is built up before the end of the Lake navigation season, the size depending on Chevrolet's estimate of its winter's activities. The transportation charge from Buffalo to Saginaw now is little more than the switching charge in the city of Detroit, whereas formerly the all-rail haul from Detroit to Saginaw cost $2.10 a ton.

Inland Mills at Disadvantage

With Great Lakes Steel Corpn. and Newton Steel Co. producing steel in close proximity to the large users in southern Michigan, it has become increasingly necessary that companies with mills farther removed from Detroit ship by water if possible in order to compete on a favorable price level with Detroit mills. The differential between the all-rail freight rate and the water rate is passed along as a saving to consumers and is freely used as a means of securing attractive business. Mills in the Pittsburgh, Youngstown and southern Ohio districts so situated that they cannot deliver steel to Detroit by water admit that they are being put more and more at a disadvantage in bidding for automobile tonnage.

Water Shipments Affect Prices

The automobile industry, fully aware of the unfavorable position of inland mills, has not insisted in all cases that these mills meet the delivered prices quoted by competitors which can ship by water. This attitude is not due as much to the philosophy of "live and let live" as to the desire to keep open as many avenues of supply as possible. This is especially necessary in times of high production. However, the prediction has been made that as soon as the capacity of mills located on the water is large enough to take care of the maximum steel requirements of automobile makers at peak periods, these users will begin to bear down on the inland mills and be less lenient in the matter of freight rates. This is one reason why steel mill construction in and near Detroit is expected to take a fresh start after the depression.

Ford Utilizes Waterways

Water shipments of raw materials and finished parts are a major factor in the manufacturing plan of the Ford Motor Co., one of the largest individual users of steel. For a number of years the Ford company has been receiving iron ore, steel, coal and other materials by boat at its Rouge plant at Dearborn, Mich. Lake freighters ply the waters of the River Rouge, the channel of which has been deepened so that deliveries can be made at the door of the Ford factories. This is only a small part, however, of Ford's use of water transportation. One of the largest major construction programs in the United States in the past two years has been the re-location of branch assembly plants by the Ford company so that they are on the water and can receive water shipments of parts from the Rouge plant. Three plants have been erected on the Pacific Coast, two in California and one in Washington, and other recently completed plants situated on the water are at Edgewater, N. J., and Buffalo. A site for a branch assembly plant also has been purchased on Lake Erie near Cleveland.

W. W. MACON
Editor

..THE IRON AGE..

A. I. FINDLEY
Editor Emeritus

(ESTABLISHED 1855)

Announcement

WITH this issue I relinquish the editorial direction of THE IRON AGE to become consulting editor. The editorship I turn over to John H. Van Deventer, whose numerous contributions to these pages in the past eighteen months assuredly make him well known to, and highly regarded by, IRON AGE readers. His signal achievement in planning the Seventy-fifth Anniversary Number of THE IRON AGE, in November, 1930—itself a monument to business paper journalism—and his searching analyses respecting today's questions of mechanization and modernization, including the epitomizing in this issue of the past year's aids to modernization, show insight and capabilities that augur well for the continued progress of THE IRON AGE and the metal-working field it serves. As for myself, I shall engage in special work for THE IRON AGE of a nature that we believe will meet with wide favor.

W. W. MACON.

Facts, Fancies and Fears

WHAT is said here is intended to be free from any taint of sunshine talk. The thesis is that men are more afraid than they need to be, that some of their troubles are of their own originating, not really economic, and that these fears will wear off, whereby conditions will improve up to the level dictated by economic conditions and then economic conditions, thus given a momentum, will improve.

It is idle to argue that we can better ourselves by thinking we are better off than we are. A return to a proper appraisal, however, is feasible. As to fear itself, time is a great tempering element. One tends to lose his fear and replace it by grim determination to make the best of a thing, however bad it may be.

Still the Land of the Free

BOTH fascism and bolshevism are forms of tyranny. They impose on the Italian and Russian peoples a military discipline that would surely break down in a country with strong traditions of freedom of speech and liberty of action. American individualism may be forced to make further sacrifices. But it will never accept such complete servitude to the State that it will give up the sanctity of the family unit, the dignity of independent belief and expression or the initiative that springs from private enterprise.

Supposed citadel of materialism, our country is actually in the forefront in its appreciation of spiritual values. Many of those who builded our nation sacrified material interests for the sake of freedom from oppression. For many years our shores were the haven of peoples who sought and found escape from the inhibitions and injustices of older and less flexible cultures. Ideals, sometimes unattainable, have been reflected in our legislation and have determined our participation in wars. Economic regimentation, like social caste and political autocracy, is contrary to the American tradition. Whatever concessions must be made to collectivism in this country will take the form of voluntary cooperation rather than bureaucratic dictation.

Length of Iron and Steel Recessions

FOR two successive years production of pig iron and steel ingots has decreased and as the rate in late 1931 was well below the average of the year a substantial increase is required to prevent 1932 from making a third year. In about three-fourths of a century, however, there were only three cases of three successive years showing decreases, each year from the preceding. Production of pig iron in 1853 and some preceding years is not known, and the study is made by taking pig iron from 1854 to 1899 inclusive and steel ingots from 1900 to recent times.

In 1873 a new pig iron record was made and then the next three years brought successive declines, the next two years bringing increases and the following year a new record. In 1882 there was record production and the next three years brought successive decreases, whereupon the next year made a new record. In 1890 there was a new record, 1891 running less, but 1892 passing 1891, whereupon 1893 was under 1892 and 1894 was still less, a new record being made in 1895. Taking steel ingot production since 1900, the extreme cases were only of two successive years making successive declines. It is true there were seven years, 1918 to 1924 inclusive, which failed to match the 1917 record, but the case need not be considered as the war had caused a very special record to be hung up. Detailed tables of the statistics of production may be found on pages 157 and following.

During the long and rapid growth of the iron and steel industry it was necessary, of course, that increases should greatly overbalance previous decreases, and the point to be brought out is merely that continuous recession has rarely lasted long. There could be partial and quite substantial recovery

without a new record being made. For instance, there was very marked overproduction of pig iron in 1890, a year in which prices underwent a very remarkable recession, and it took five years to pass that record markedly because it was not a justifiable one.

It was always noticeable that demand grew while it slept, so to speak. Arrearages accumulated, production being under what may be called in a sense the actual ultimate consumption, whereby it became so much easier for demand to increase. In this case there has been generally receding production since May, 1929, in pig iron, and since June, 1929, in steel ingots.

Presumably a number of years will elapse before the peak production of two and a half years ago is exceeded, but a substantial upturn of really gratifying character is a much simpler matter. In the fore part of 1931 there was thought that consuming lines had certain irreducible minimums in their requirements, and when such supposed minimums have since been transgressed it may well be argued that arrearages began accumulating.

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About the Foreign War Debts

CONGRESS has voted that, while granting to our foreign debtors a delay, it will not forego settlement of the indebtedness of foreign governments to the United States.

The advisory committee on reparations under the Young plan, sitting at Basle, has just reported that Germany is unable to pay its annuities under existing conditions.

The European nations to whom the German annuities are due intimate, although they have not said so officially, that they can not pay us if Germany does not pay them. The German obligation to them is about $425,000,000 per annum, while their annual obligation to us is about $250,000,000, in aggregate.

Amid the welter of intimations, inferences and recriminations are the following: The debts owed to us by Europe were incurred to a large extent subsequent to the war. They have already been generously scaled down. They are independent of German reparations. If the several countries of Europe would reduce their armies and navies they would have no difficulty in paying their debts. These are American contentions.

On the other hand it is represented that there is a powerful party in Germany that proposes to repudiate the payment of reparations. The French, who have been invaded three times in a century, contend that they can not reduce their armaments and be safe.

In all of these points of view there is merit. Our Congress says that it will not give way; that the credit that was extended to Europe was derived from the bond issues that were subscribed by our people, who have got to be repaid anyway. Our creditors say that they cannot pay us if the Germans do not pay them. The Germans say that at present they can not pay anybody, irrespective of the injustice of the Treaty of Versailles, about which they are bitter.

It is all a sorry mess and sooner or later it must be straightened out. At the present time we are deadlocked among views of positions that seem from each angle to be meritorious. It appears to us, however, that we should get ahead if we could by international conference establish a thoroughly understood distinction between war debts and post-war debts, and also might have a review of the subject of capacity to pay.

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Alloy Steels for Tonnage Applications

A MAJOR development in alloy steels last year was the appearance of a type suitable for tonnage applications, as in the structural field. Containing small percentages of chromium, manganese and silicon, it is believed to have uses which, in substitution for plain carbon steels, have hitherto not been considered. In short, the steels are proposed for large scale work where cost must be kept low in spite of improved properties. In speaking of the structural field we have in mind marine, railroad and general engineering construction.

One of these "cromansil" steels was discussed in THE IRON AGE of Dec. 31. The three alloying metals approximate only 2½ per cent of the total. The new steels promise to add materially to the demand for low-alloy products, which have long included a low nickel type, one containing small amounts of vanadium or chromium and vanadium, as well as one low in molybdenum. And there are the familiar and older medium manganese and copper-bearing steels. The importance of the whole matter is that we may be entering on a new era in alloy steel practice and usage, particularly if we have a material of superior qualities that may be utilized in the as-rolled condition or after merely a simple normalizing treatment.

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Casuals

THOUGHTLESS talkers about tax increases seem to forget that the primary object of raising taxes is to get money and not to effect social reforms. Talk of very high rates on large incomes is of this nature, for there are not likely to be enough large incomes under present circumstances for even a 100 per cent tax upon them to raise an amount of money in any way comparable to what the Treasury needs. The raising of money is one thing and the extinction of large incomes is another.

* * *

A shrewd observer who recently returned from Russia remarked that any man in an American breadline is physically more comfortable than the average worker under the Soviet. He said "any worker," but tempered that in order to be conservative.

* * *

When we observe the difficulty that the copper producers find in getting together to remedy an obviously simple situation of adjusting a 125,000-ton monthly production to a 95,000-ton consumption, we can be lenient to Congress arguing in respect to more complicated affairs.

MODERNIZATION

AT no time in our industrial history has there been a more intensive improvement in the broad range of metal-working machinery and materials than during the past year.

Production may therefore now take the forward step which will place it upon a new efficiency level; a level upon which it can rebuild prosperity, in spite of reduced volumes and diminished consuming power.

That improved machinery and materials stand ready to do their part is emphatically demonstrated in this number of THE IRON AGE. The section which follows depicts some of the important and significant developments in the metal-working field which have taken place in 1931. It forms a perspective of progress that will aid the works manager's approach to the replacement problem.

But it must not be assumed that merely replacing the old with the new is modernization. It is only replacing the inferior by the superior that counts. And in giving thought to that principle, we must not overlook the still superior machine or material of previous vintage which cannot be included in a review confined to 1931 developments.

Taken in connection with the machinery and materials described in the advertising pages, this section will serve its intended useful purpose if it conveys the picture of the increasing tempo of progress in our industry and the necessity of keeping step with it, in order to bring us to better times.

John Van Deventer

ALLOY STEELS AND

A Brief Review of Some Significant Developments in Materials and Metallurgy ▲▲▲

ALTHOUGH 1931 has been a year of curtailed production in the iron and steel industry, due to falling off in demand by ultimate users of steel products, there has been, on the other hand, a tendency on the part of steel consumers to specify larger quantities of alloy steel and alloy iron to replace simple steel and ordinary iron castings. Competition has caused engineers to give more favorable consideration to the use of alloy steel on account of its special properties, making it possible to decrease weight, increase safety, and offer greater resistance to abrasion, corrosion, and oxidation. This demand for alloy steel and alloy iron has made it necessary for ferroalloy manufacturers to produce new forms of ferroalloys, or modified combinations of alloys, so that the work of the steel and iron producer could be simplified and his costs kept to the lowest possible level. Some of the most important developments in the year 1931 are here outlined:

In the cast iron industry there has been a demand for improvement in the quality of high strength iron and gray iron castings. This improvement has been made possible by the addition of ferrosilicon, ferromanganese, and ferrochrome in the form of briquets to the cupola. These briquets are made of ground ferroalloys bonded together by a refractory material which protects the alloy from oxidation until it reaches the melting zone of the cupola.

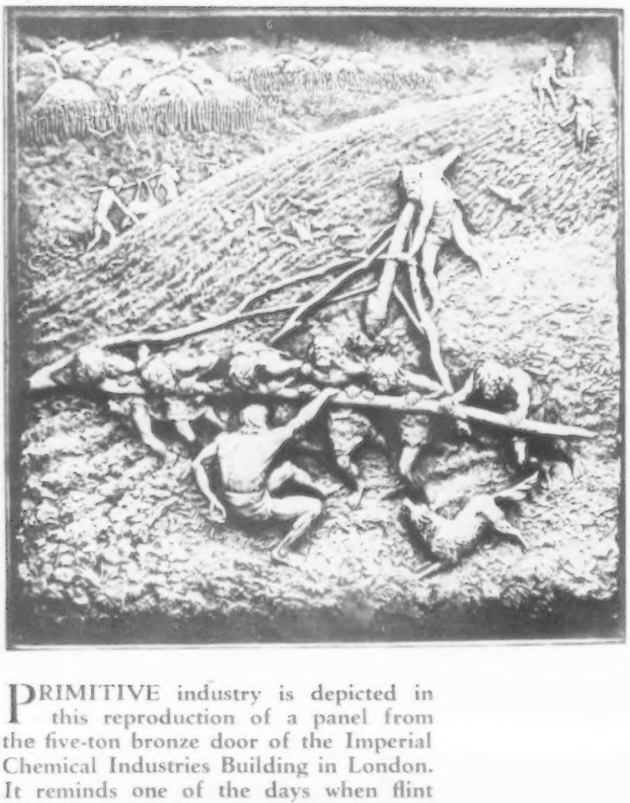
Ferroalloy Briquets for Gray Iron

Improvement in gray iron castings has been made through the use of silicon briquets accompanied by larger percentages of steel scrap in the charge. Because of lower carbon content and more uniform distribution of small graphite particles, iron castings can be made to show higher tensile strength with no increase in Brinell hardness.

Silicon briquets are made containing exactly 2 lb. of metallic silicon, chrome briquets with exactly 2 lb. of metallic chromium, and manganese briquets with exactly 2 lb. of manganese. This permits the foundryman to add a definite number of briquets for the composition desired in his iron and eliminates the errors resulting from weighing. Through the use of briquets containing ferromanganese and ferrochrome it has been possible for foundrymen to obtain castings with greater resistance to wear and abrasion. With higher percentages of chromium castings have been made which will resist oxidation.

More Alloy Steel Castings

In steel foundries the trend has been toward greater production of alloy castings of many varieties, some of which are made to give greater strength, accompanied by reduced weight, while others are alloyed with elements which offer greater resistance to corrosion and oxidation.



PRIMITIVE industry is depicted in this reproduction of a panel from the five-ton bronze door of the Imperial Chemical Industries Building in London. It reminds one of the days when flint and sharpened stakes represented man's working appliances. ▲▲▲

ALLOYS IN 1931

By W. J. PRIESTLEY
Vice-president, Electro Metallurgical Co., New York

There has been a growth in the use of chrome-molybdenum castings for crushing and grinding apparatus. Many foundrymen have established the practice of adding small percentages of vanadium ranging from 0.05 to 0.10 per cent to steel castings for the purpose of refining the grain size.

In the new 1931 "Recommended Practice for Coal Mine Drainage," sponsored by the American Mining Congress, chrome-iron castings containing between 18 and 28 per cent chromium are mentioned for use in mine pumps and accessories handling acidulous mine water. The physical properties of high chrome steel and iron make this metal practical for drainage equipment in cast form for all parts not too heavy and complicated. For piston rods, shaftings, bolts, nuts, etc., rolled metal is recommended. This same metal is being considered in the form of tubing for gathering pipe lines which are frequently buried in concrete where permanence is required.

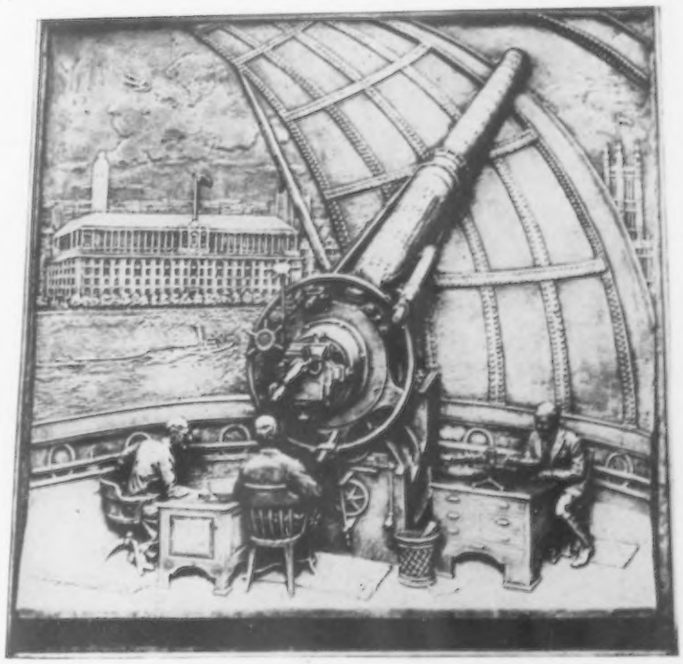
Castings Coated with Chromium

The process of coating steel castings with chromium is being used successfully for many different purposes. It consists of impregnating the outer surface of a casting with a thin coating of ferrochrome. This is accomplished by coating the surface of the mold with powdered ferrochrome. It imparts intense hardness for resisting wear and abrasion. The high chromium on the surface of the casting resists oxidation and corrosion at high temperatures.

A thin coating of ferrochrome placed on the inner surface of ingot molds reduces erosion and prolongs the life of the mold. The resistance of high chromium iron alloys to sulphur corrosion and abrasion makes this process suitable for use in the manufacture of the following equipment: Annealing and carburizing boxes, lead and salt bath pots, conveyor equipment handling hot cement and cinders, and rolled mill parts such as wabblers, spindles, pinions, coupling boxes, etc.

Special Alloys for Open-Hearth Process

In the manufacture of open-hearth steel considerable improvement in quality has been obtained by the use of combination alloys containing silicon and manganese. When a combination of silicon and manganese in a single alloy is added to an oxidized bath of open-hearth steel, the product of oxidation is a silicate of manganese which has a comparatively low melting point and rises rapidly out of the steel. Several grades of silicon manganese alloys have been used. The silicon content has varied from 5 to 16 per cent and the manganese from 20 to 70 per cent. The latest development indicates the desirability of using an alloy in the proportion of five parts of manganese to one of



TODAY, science searches even among the stars for new metals and elements for man's use and enlightenment, probing into the universe with the powerful finger of research. This picture is also a panel from the Imperial Chemical Industries Building.

silicon, and preference seems to be for an alloy containing 12 to 14 per cent silicon and 65 to 70 per cent manganese.

Alloy Steel Rails Have Advantages

Results of service tests on open-hearth steel in the form of railroad rails containing 3 per cent chromium have recently been obtained which indicate a noteworthy advance in this field of engineering. These rails show excellent properties in the hot-rolled condition when drop tested. While deflection is less than that for medium manganese rails, the elongation is greater, thus indicating a more uniform resistance to cross bending and greater ductility between supports. With a Brinell hardness of 375 it was difficult to break some of the test rails, even after the sections were nicked all around. After two years of service the wear on the 3 per cent chrome rails has been practically undetectable with the apparatus used for testing wear on rail sections.

A New Nitriding Steel

A new kind of nitriding steel containing chromium and vanadium has been introduced which is simpler to manufacture and possesses greater uniformity than the present type of nitriding steel on the market. This steel may be made in the open hearth or electric furnace and has good forging properties. It has remarkable wear-resisting properties, retains its hardness at elevated temperatures, as well as having good resistance to atmospheric and water corrosion. It can be nitrided by the ammonia case hardening or cyanide process with a minimum amount of distortion.

Considerable interest has been shown by naval architects and shipbuilders during the past year in the possibilities of using higher strength

THE age of basic discovery, in any art, is followed by the age of refinement. This, today, is especially apparent in the case of man's most useful metal — steel. Higher and higher are the requirements lifted, with successive discoveries in alloying. What will be the steel of tomorrow?

steel for lightening ship construction; this would result in increased speed and saving of fuel. They are also seriously considering the use of high chrome steel for ship parts subject to sea water corrosion. Considerable progress has been made during the past year in the development of built-up welded construction to replace riveted structures.

More Uses for Rustless Steels

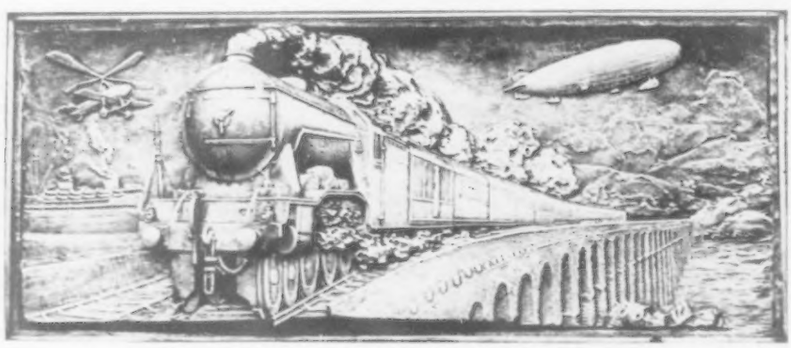
In the oil cracking industry the use of rustless and rust-resisting steel has become more intrenched. Economies have been effected by operating at higher working temperatures and greater pressures; these conditions are not readily possible with plain carbon steel. The elimination of lost time due to interruptions for rebuilding and repairs justifies the use of rustless steel despite its higher cost.

The corrosion problems in the dairy industry have been practically eliminated by the use of chrome-nickel rustless steel. This metal is insoluble in milk products and is most resistant to brines and chemical sterilizers used in dairy plant operation. During the past year welding problems have been satisfactorily solved, and a large majority of dairy equipment manufacturers are using rustless steel. In new building construction greater uses have been made of rustless steel for architectural work and resistance to atmospheric corrosion. Engineers are showing greater favor for the use of alloy steel for construction purposes such as bridges and special structures. For work of this kind they are considering silicon, manganese-silicon, and chrome-manganese-silicon steels. There has been a wider use of nickel steel for boiler plates.

Special Acid Resistant Alloy

The demand for a metal to resist hydrochloric acid has resulted in wider use of nickel-molybdenum iron which may be forged, rolled in a sheet, or made in the form of castings, suitable for welding with the oxy-acetylene or electric arc method. This alloy has also good resistance to sulphuric acid, acetic, formic, and certain other acids.

During the past year attempts have been made to roll laminated sheets of nickel and rustless steel with plain carbon steel, where the cost of homogeneous alloy steel was too great. There is a demand for a rust-resisting steel which will be less expensive than the higher priced alloy steels. In several instances 5 per cent chrome steel has been used for this purpose. It has been used for reinforcing concrete rods in hydraulic construction; also for tubing and fittings in apparatus subjected to corrosion of liquids and gases, and is now being considered for oil tanks and coal cars requiring resistance to the corrosive action of sulphur products.

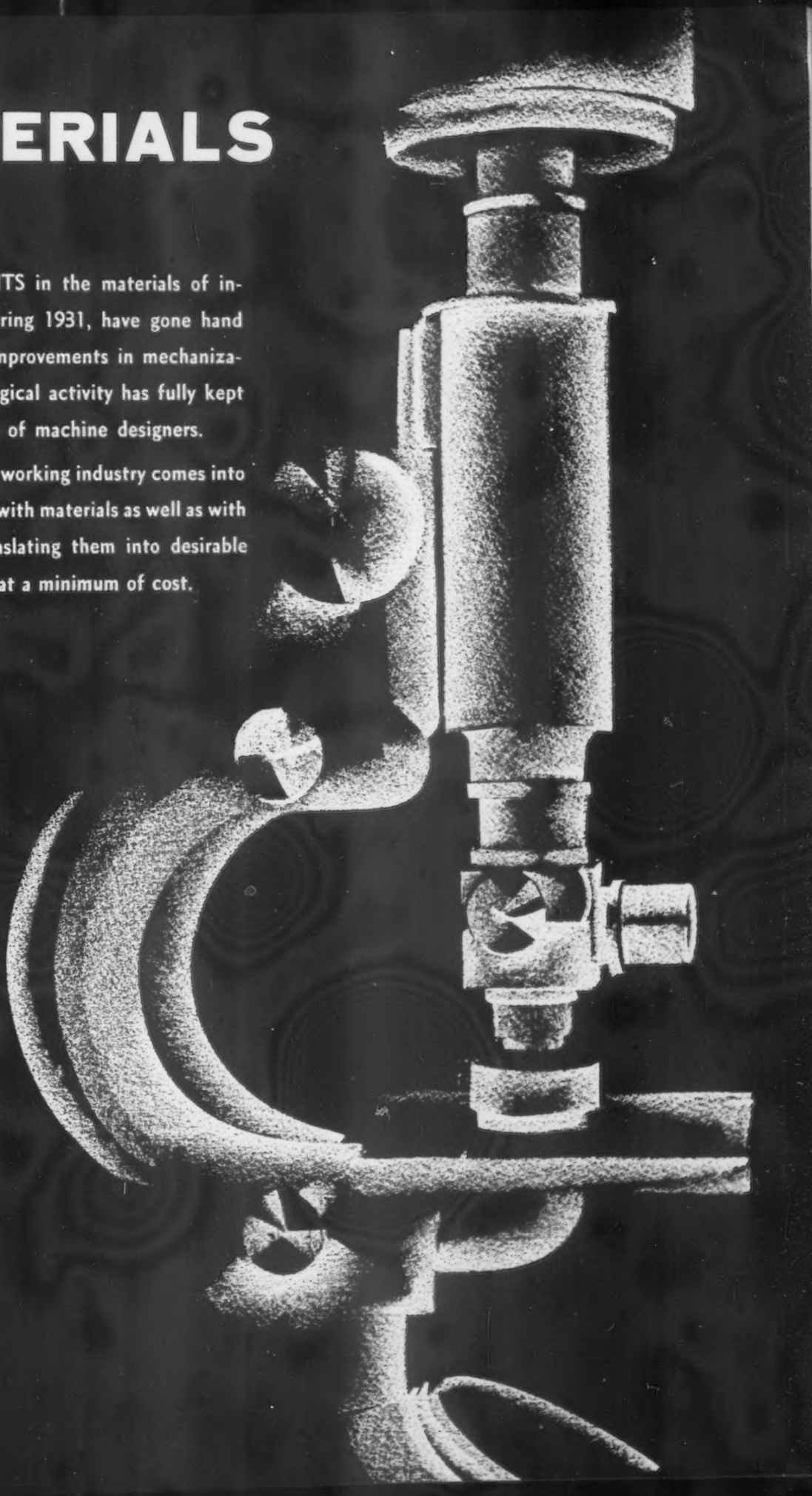


AND out of the evolution from flint and stick of primitive man, through the test tube, the microscope and the telescope, have come the knowledge and the power to create man's modern mechanisms.

MATERIALS

REFINEMENTS in the materials of industry, during 1931, have gone hand in hand with improvements in mechanization. Metallurgical activity has fully kept pace with that of machine designers.

So the metal working industry comes into 1932 prepared with materials as well as with means for translating them into desirable new products at a minimum of cost.



NEW MATERIALS FOR THE

MATERIALS are the alphabet with which engineers compose the epic of progress, as expressed in new machinery and new products. ▲ ▲ ▲

Nickel-Clad Steel Plate—*Lukens Steel Co.*

THIS is a new, hot-rolled, bi-metal plate, manufactured under the trade name of "Lukens Nickel-Clad Steel Plate." The product is a steel plate protected on one side with a layer of nickel. The base plate is usually flange quality steel. The finish is that of a hot-rolled plate. The nickel is homogeneous and dense in structure and the nickel and steel are bonded together.

Large plates and standard formed heads are obtainable in this material in thicknesses 3/16 in. upward. The nickel cladding is furnished in thickness ranging from 10 to 20 per cent of the total sheet thickness.

Cold fabrication follows the methods used for steel. In hot work, low sulphur fuel must be used. In welding, the steel side is first welded according to the usual practice and then the nickel side is welded with nickel, flux coated wire.

▲ ▲ ▲

Corrosion and Heat Resisting Alloy Wires—*Wickwire Spencer Steel Co.*

A NEW line of corrosion and heat-resisting alloy wires, the product is known as Stainless Wissco, has been added to the present variety of wires and wire products sold under the trade name of Wissco.

Other special alloys such as the Free Machining Stainless Iron and high strength steels are being drawn for particular applications.

The company is also specializing on very fine wires down to 0.003 in., either annealed or drawn to high tensile strengths, approaching in stiffness, music and oil tempered spring wires.

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Free Cutting Stainless Steel—*Republic Steel Corporation*

THIS product is known as Enduro-FC free cutting stainless steel and meets a demand for an alloy combining the free-cutting qualities of Bessemer screw stock with the corrosion and heat-resisting characteristics of high quality stainless steel. It is recommended for parts requiring turning, boring, drilling, threading, grinding or polishing and at the same time resistance to rust and corrosion. The typical analysis follows: Carbon, 0.05 to 0.12 per cent; manganese, 0.25 to 0.50 per cent; silicon, 0.50 maximum; chromium, 12½ to 15 per cent.

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Galvanized Steel Sheets—*Eastern Rolling Mill Co.*

THIS company during the past year announced its entry into the galvanized sheet market by bringing out an addition to its products—a galvanized steel sheet under the trade name "Oriole."

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Special Carburizing Steel—*Union Drawn Steel Co.*

THIS product, which was brought out in the latter part of last year, is a cold drawn steel for use in the manufacture of piston pins, bushings, gears, bearings and various automobile parts, which require a case of uniform hardness having resistance to abrasion and wear and backed up by a core of toughness and ductility.

▲ ▲ ▲

Alloy Machinery Steel—*Wheelock, Lovejoy & Co., Inc.*

THIS new product, Economo No. 20, is a 0.18 per cent carbon molybdenum basic open-hearth machinery steel, developed to compete with commercial machinery steel, S.A.E. 1020, and the high manganese-sulphur steels, and capable of being easily case-hardened.

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Carpenter Stainless Steel No. 8—*Carpenter Steel Co.*

THIS is an 18-8 rustless steel emphasized as free machining and broadening the field of usefulness of chrome-nickel rustless steels, as in the case of small parts made from drop forgings and machined, or made on automatic screw machines from bar stock.

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Razor Blade Steel—*Heppenstall Co.*

LAST year this company developed and put on the market a safety razor blade under the trade name "Hardtem." It is manufactured from an alloy steel produced in a high frequency induction furnace.

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Steel Sheet Piling and 4-Way Floor Plates—*Inland Steel Co.*

THESE new products were brought out last year. The floor plate designed to be non-skid in any direction

METAL-WORKING INDUSTRY

ON the following pages we present some of the past year's additions to our store of metal-working materials.

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is for factory floors, car steps, stairways, sidewalk doors and the like.

The steel sheet piling comes in several different sections.

▲ ▲ ▲

Corrosion-Resisting Steel—
Bethlehem Steel Co.

UNDER the name of "Bethadur" this company offers a new corrosion-resisting steel made in nine grades for all corrosion-resisting purposes except where free machining is called for. The nine grades are as follows:

No. 1—low-carbon, chromium steel; No. 2—18 per cent chromium, 8 per cent nickel steel; No. 3—high-nickel, medium-chromium steel for dilute acids; No. 4—corrosion-resisting steel developed especially for high resistance to nitric acid; No. 5—low-carbon, high-chromium steel, for cold forming; No. 6—standard cutlery grade of non-rusting steel; No. 7—for highest combination of hardness and toughness; No. 8—corrosion-resisting steel with maximum hardness; No. 9—combining resistance to corrosion with maximum scale resistance at high temperatures.

Also, Beth-Cu-Loy, an open-hearth steel to which ingot copper has been added to insure high rust-resisting properties, and Beth-Co-Weld, which is an electrode of silico-manganese steel, used for building up silico-manganese track work.

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Air Hardening Die Steel—
Ludlum Steel Co.

UNDER the name of "Ontario" this company brought out a high chromium, air hardening die steel containing vanadium and molybdenum. The typical analysis shows carbon to be 1.48 per cent; chromium, 12.58 per cent; vanadium, 0.89 per cent, and molybdenum, 0.95 per cent.

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Sintered Carbide Compositions
Firth-Sterling Steel Co.

THESE are several new grades of tungsten and other carbides for cutting tools and a number of grades were introduced under the name of Firthite.

The company evolved a grade for application in the nibs or wearing surfaces of drawing and extrusion dies, licensing the Detroit Wire Die Co. to make the dies.

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Rust-Resisting Steel Sheets—
Superior Steel Corporation

UNDER the name of "Su Veneer Metal" this company introduced steel sheets veneered on one or both sides with 20 per cent rust-resisting metal, in widths from ½ in. to 22 in. and in thicknesses of 0.015 in. and heavier, and in coils or straight lengths and in regular silky finish or very bright annealed.

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New Alloy Steels—
Timken Roller Bearing Co.

LATE last year three new alloy steels for use in the power and refining industries were brought out by this company, to supply material of high strength at elevated temperatures, combined with reasonable cost. Three analyses combine the various physical properties developed by the use of manganese, tungsten, molybdenum, vanadium and chromium. They are intended for high pressure boilers, superheaters, cracking still tubes, bolts, valve bodies, and the like. The combination of alloys, the heat treatment, and the applications are new and suggest such possibilities as boiler tubes of relatively thin walls even for the high temperatures and high pressures that are marking the trend of steam boiler design.

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Special Alloy Steels—
Electro Metallurgical Co.

A NEW low-alloy steel has been developed which can be used in the as-rolled condition and can be welded without air hardening. It is known as "Cromansil" and has the following composition: Carbon 0.10 to 0.65, chromium 0.40 to 0.60, manganese 1.10 to 1.40, and silicon 0.70 to 0.80 per cent. It is suitable for staybolts in the lower carbon range and for boilers, pressure vessels, ship plates, bridge work and so on in the intermediate and higher carbon ranges.

Another product is a new nitriding steel containing 1.50 per cent chromium, 0.50 per cent vanadium and 0.30 per cent carbon.

A new silico-manganese alloy for deoxidizing and refining open-hearth steel contains 12 to 14 per cent silicon and 65 to 75 per cent manganese.

Briquets containing definite quantities of chromium and manganese as ferroalloys are offered for foundry use.

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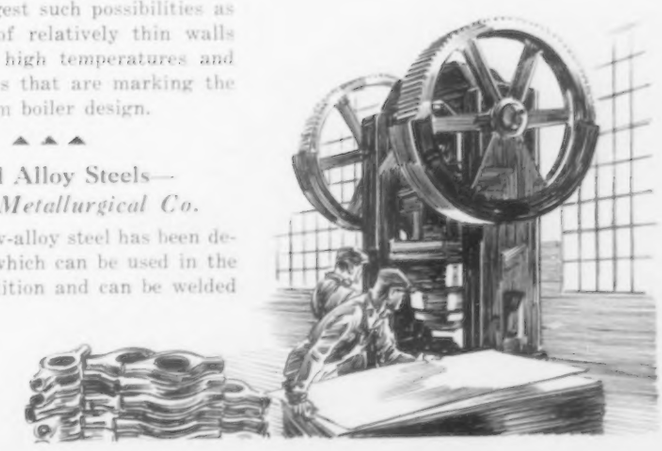
Special Lined Steel Tubing—
Detroit Seamless Steel Tube Co.

A NEW method of lining steel tubing with a variety of metals or alloys was announced last year by this company. Of particular importance to industrial users is the fact that in combining the inner lining metal with the outer steel shell the two are bonded by fusion without



NEW MATERIALS FOR THE

evidence at the area of junction. Tubes come in lengths up to 16 ft. and more and are recommended for quantity production of bearings. The inner lining is accomplished centrifugally under heat. Bronze, copper and tin as well as bearing bronze have been used for the lining metal.

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Rustless Steel Sheets—*American Sheet & Tin Plate Co.*

THIS company, together with some of the other subsidiaries of the United States Steel Corporation, introduced last year various brands of rustless and heat-resisting steels in the form of sheets and light plates, as well as strip, wire and several other finished steel products. They are manufactured under such brand names as U S S 18-8, U S S 17, U S S 12, U S S 27 and U S S 25-12, which indicate the approximate composite of chromium and chromium and nickel.

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Heavy-Coated Galvanized Sheets—*American Sheet & Tin Plate Co.*

IN the fall of 1931 this company announced the production of a product termed "American Heavy-Coated Galvanized Sheets," intended particularly for steel roofing and siding. Both corrugated and V-crimped galvanized sheets are given 2 oz. of zinc coating to 1 sq. ft.

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Rustless Wire Rope—*Hazard Wire Rope Co.*

THIS is a chrome-nickel steel wire rope brought out under the name of "Korodless," to resist the attack of salt water or salt air, and also to operate at temperatures up to 1650 deg. F.

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Rustless Steel Tubes—*Globe Stainless Tube Co.*

MANUFACTURED especially for food product plants, dairy plants and the like, a sanitary stainless tube with highly polished inside surface was brought out by this company. The product can be made in a range of sizes in lengths up to 20 ft. and with either polished inside or outside surface or with polished inside and a pickled outside surface.

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Sucker Rods and Welding Fittings—*Reading Iron Co.*

THESE new products, developed last year, are made from puddled wrought iron by the Midwest Piping & Supply Co. The fitting is unusual in that it has but one welded seam on the inside of the bend, the outside being uniform standard pipe wall thickness.

Sucker rods, in ¾-in. and ⅞-in. sizes are used to avoid the crystallization caused by hydrogen-sulphide corrosion.

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Wrought Iron Sheets, Plates and Pipe—*A. M. Byers Co.*

THIS company last year developed facilities to produce in quantity sheets, plates and bending pipe of wrought iron, to foster large scale manufacturing with this form of ferrous product.

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Alloy Steel Castings—*Chicago Steel Foundry Co.*

NEW products brought out by this company included cast steel "Helicoid" screw conveyors made in sectional cores from an extruded pattern which does away with any parting line and is calculated to produce an exceptionally smooth screw. Lengths, diameters and pitches may be had as desired.

For high temperature and also highly corrosive conditions, the company developed a heat and acid resisting alloy "Pyrasteel."

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Electric Alloy Steel Casting—*Lebanon Steel Foundry*

THREE special alloy steel castings were developed by this company. One is a nickel-molybdenum carburizing steel known as "Circle L 6," for parts that require a tough core and a hard outer surface that must be carburized with a minimum of distortion.

The second steel is a high permeability steel, "Circle L 7," for motor frames and housings, magnetic chucks and other electrical parts.

The third steel is a chrome-vanadium nitriding steel, "Circle L 8," for steel castings which are to be nitrided, as in pumps and valves. The analysis of this steel is carbon 0.15, chromium 1.50, vanadium 0.50 per cent and by modifying the analysis and heat-treatment the steel can be developed to give a hard body to back up the nitrided case, where heavy pressure on the case is to be resisted.

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Copper Alloys—*American Brass Co.*

LAST year this company produced two new copper alloys, "Anaconda Special Free Cutting Phosphor

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New Materials Are the Pathfinders of New Products.

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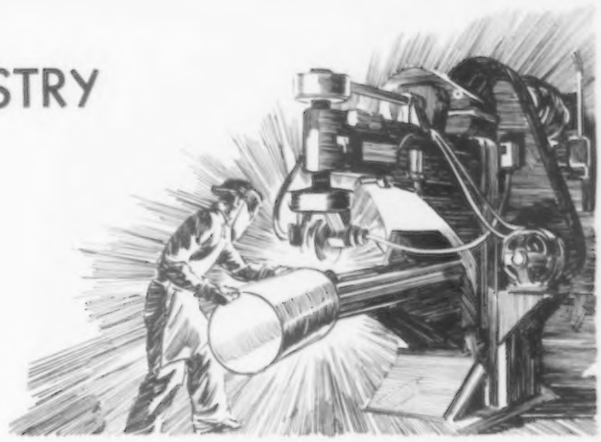
METAL-WORKING INDUSTRY



Bronze" and "Extruded Architectural Everdur Metal No. 9."

The first one was developed to meet the need for a rod in 10-ft. and longer lengths which would cut freely on automatic screw machines; the alloy is composed of copper, tin, zinc, lead, with a small amount of phosphorus. It is for use in the manufacture of bushings and bearings, small gears and other machine parts requiring strength and resistance to wear, fatigue, and corrosion.

The second product is an alloy containing copper, zinc, manganese and silicon, for fabricators of windows, doors, etc. Extruded shapes of this new alloy have an average tensile strength of 63,000 lb. per sq. in. and an elongation of 35 per cent in 2 in.

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Zinc Die Casting Alloy—
New Jersey Zinc Co.

UNDER the name of "Zamak-3" a new zinc die cast alloy was announced last year. Its composition is: Aluminum, 4.10 per cent; magnesium, 0.04 per cent; horse head special zinc, 95.86 per cent. Its tensile strength is 36,600 to 44,000 sq. ft. per in., with elongation of 4 to 6 per cent and a Brinell hardness of 56 to 68. It is emphasized as making die castings that are free from dimensional changes and as workable at lower temperatures than usual.

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Brass Die Castings—
Doehler Die Casting Co.

THIS new class of die castings was brought out by this company, marking the succumbing of copper base alloys to the die casting process and realizing the trials of years to manufacture intricate brass parts in a single casting operation.

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Aluminum Bronze Die Castings
Aurora Metal Co.

THIS alloy has a composition of 89 per cent copper and 10 per cent aluminum, and 1 per cent iron. When die cast under pressure this alloy has a tensile strength of 85,000 lb. per sq. in., with a Brinell hardness of 140. Starting with tensile strength of 84,800 lb. per sq. in. at 70 deg. F., the alloy at 550 deg. F. is credited a tensile strength of 59,000 lb. per sq. in., and at 1000 deg. F., a strength of 19,000 lb. per sq. in.

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Pig Lead—
St. Joseph Lead Co.

A NEW brand of pig lead under the trade name of "Herculaneum" is made at Herculaneum, Mo. It is described as being particularly well adapted for use in the manufacture of shot, solder, pipe, etc., assaying better than 99.98 per cent.

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Magnesium Alloys—
Dow Chemical Co.

A NEW alloy under the designation "Dowmetal G" was brought out last year with a nominal composition of 89.9 per cent magnesium, 10 per cent aluminum and 0.1 per cent manganese. It is for heat-treated castings where high yield point and hardness are of prime importance. As cast the alloy has a tensile strength of 20,000 to 22,000 lb. per sq. in. with a Brinell hardness of 50 to 55. Various methods of heat treatment recommended by the company bring the tensile strength from 28,000 to 38,000 lb. per sq. in. and a Brinell hardness as high as 80.

New Aluminum Alloy
Aluminum Co. of America

A NEW aluminum alloy has been developed, designed to bridge the gap between the readily workable commercial alloys such as 3S and the harder heat-treatable so-called "strong" alloys. Although not susceptible to heat treatment, the new alloy can be given increased strength by cold working. It is to meet a demand for forming articles which require workable material in the forming but at the same time will be sufficiently stiff to resist permanent deformation.

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Special Bakelite Materials—
Bakelite Corporation

LAST year new shock resistant molding materials were announced by this company with a range of 2.4 to 24 ft.-lb. Also a new odorless laminated material where a non-heat-conducting or insulating material is desired. Also new designs of "Bakelite Laminated" for attachment to metal panels, door trim, cabinet work and other structural purposes.

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Special Lubricant
Pennsylvania Lubricating Co.

THE most conspicuous contribution in new products made by this company last year was its "Penola Leaded Compound." This is produced in various forms to meet demands for an extreme pressure lubricant for gears and bearings, recognizing the increase in the forces and pressures for which gears and bearings are being designed.

A similar new development was the introduction of a new type of grease possessing extreme film strength, known as "Penola Heavy Duty Roller Bearing Lubricant."

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Industry's New Products Create New Demands, Open New Markets.

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HEAT-TREATING IS READY

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A BATTERY of electric, bell type furnaces for the bright annealing of cold rolled strip. A cost of $3 per ton has been attained for annealing low-carbon cold rolled strip with this process. Also applicable to bright annealing of non-ferrous wire.

(General Electric Co.)

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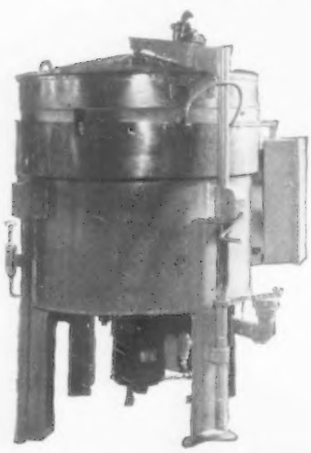
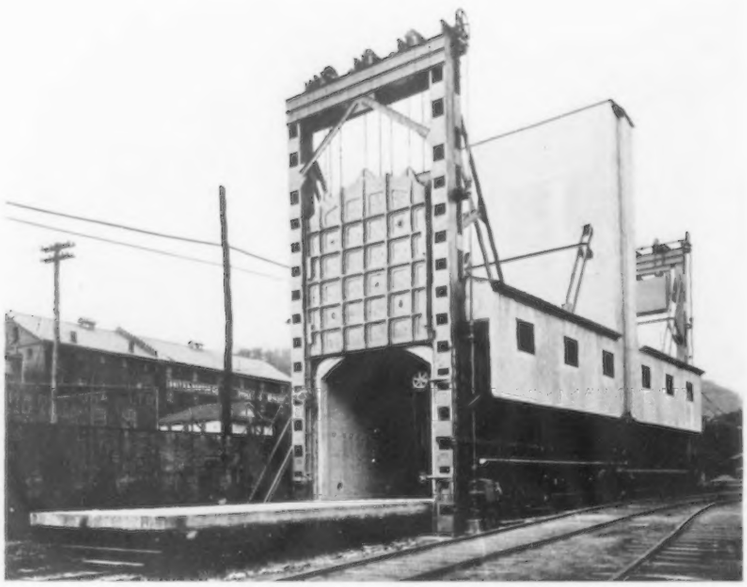
A MULTIPLE process heat-treating furnace (Below) which can be used for hump hardening, homo-tempering or homo-nitriding. Particularly applicable where there is not sufficient nitriding to require a full time, specialized furnace. It is known as the "Ho Hump" furnace.

(Leeds & Northrup Co.)





THIS furnace, installed at the plant of the Struthers Wells Titusville Corpn., Warren, Pa., is pointed to as the world's largest type annealing furnace. It is used for annealing large fusion welded containers and is fired by gas. It is over 70 feet long. Automatic heat control restricts temperature variation to a maximum of 25 deg. F., effected through the use of eight heating zones.

(Mahr Mfg. Co.)

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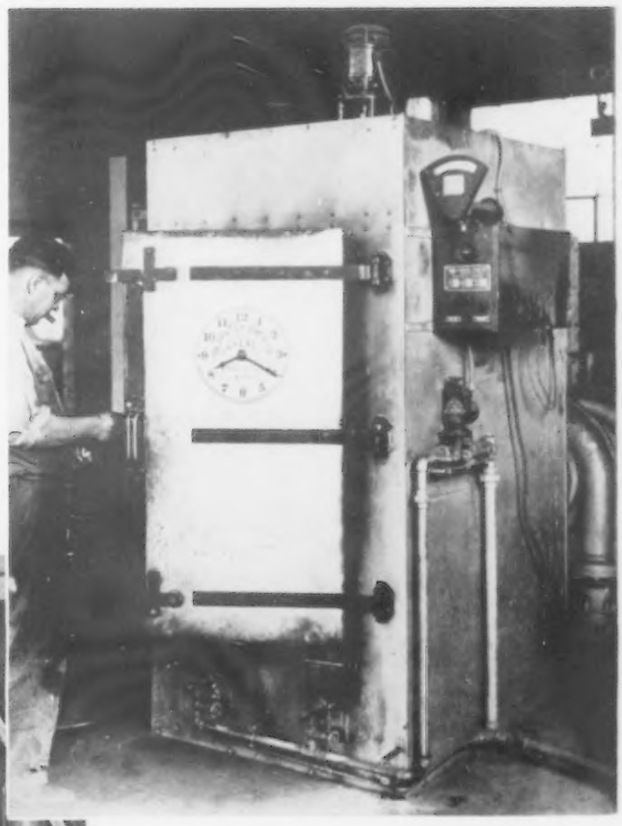
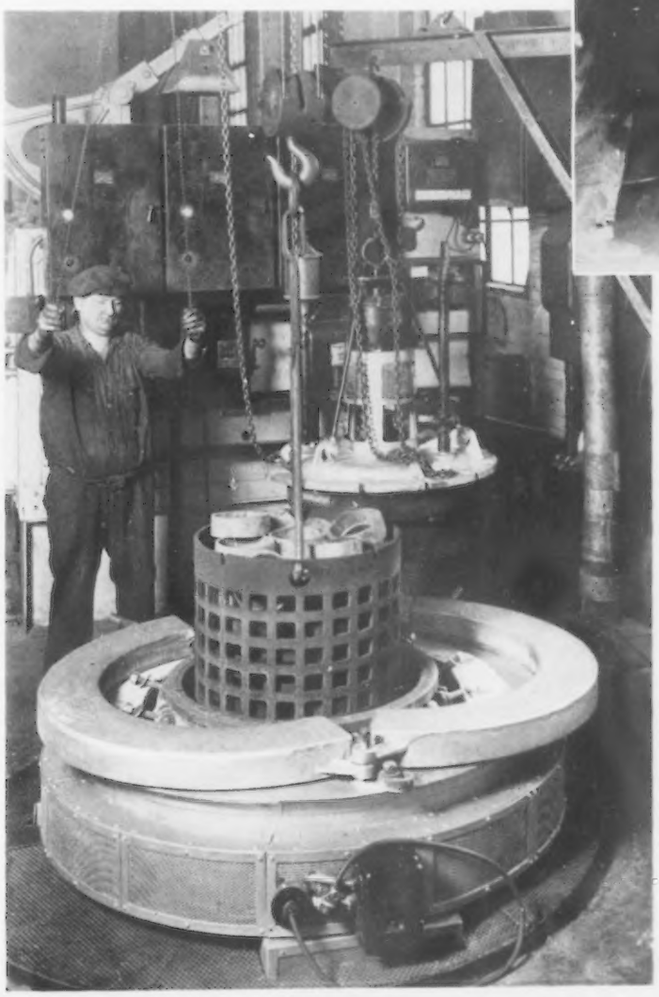
FOR BETTER BUSINESS

Competition Is the Best Balance for Weighing Equipment



THIS electrical vertical carburizer produces a hydro-carbon atmosphere through a vaporization of "Carbonol," a carefully blended oil derived from a vegetable compound. By a slight change of furnace fittings, it can be used for nitriding, annealing, normalizing, hardening or tempering.

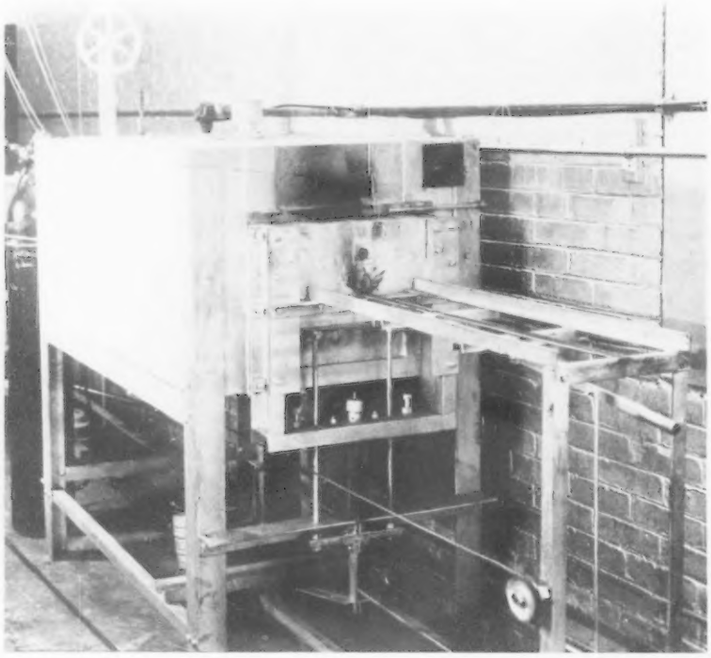
(Hevi Duty Electric Co.)



THIS gas-heated, air drawing oven is furnished with a recirculating ventilating system. It is equipped also with automatic heat control and timing devices. A variation of only 5 deg. F. over a 24-hr. operating period has been recorded.

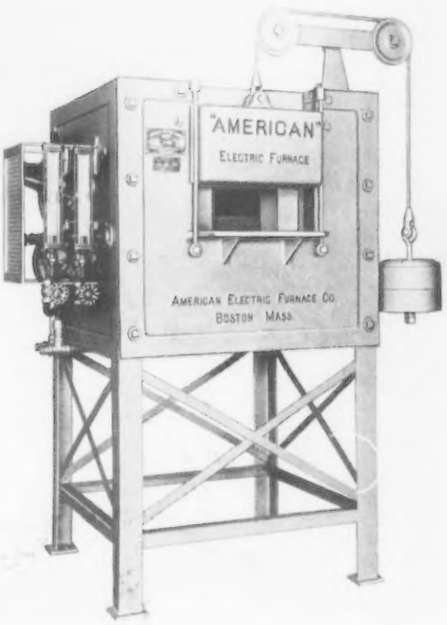
(Despatch Oven Co.)

HEAT-TREATING IS READY



THIS is a Preeco special atmosphere electric box type annealing furnace, recently installed in the plant of D. E. Makepeace Co., Attleboro, Mass., for bright annealing gold and silver and various precious and plated metals. It is of 15 kw. capacity with a heating chamber 12 in. wide and a cooling chamber 60 in. long.

(*Process Engineering & Equipment Corpn.*)



THIS is a Preeco special atmosphere electric conveyor furnace recently installed in the plant of Whiting & Davis Co., Plainville, Mass. It is of 54 kw. capacity, having a conveyor belt 12 in. wide, a heating chamber 72 in. long and a cooling chamber 120 in. long. It is used for bright annealing brass, nickel silver and steel stampings, brass strip and coiled brass wire.

(*Process Engineering & Equipment Corpn.*)

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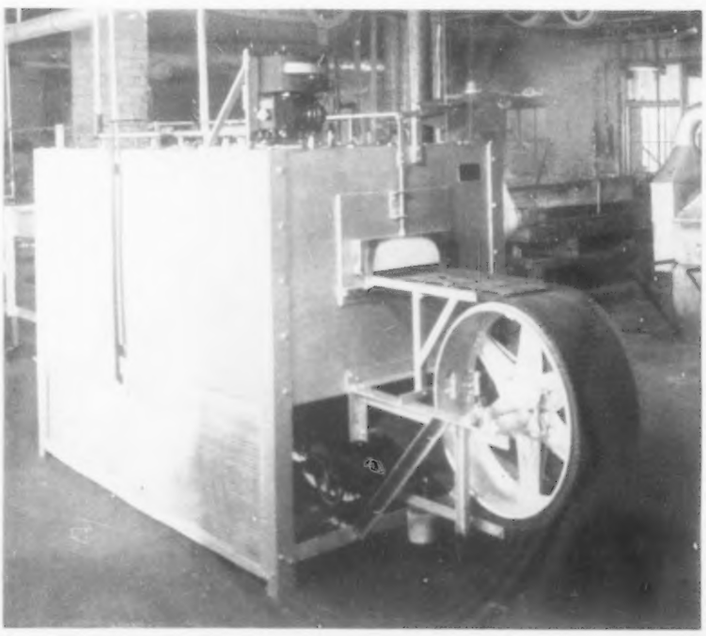
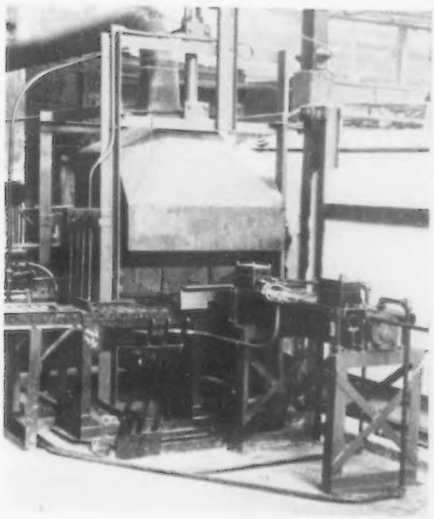


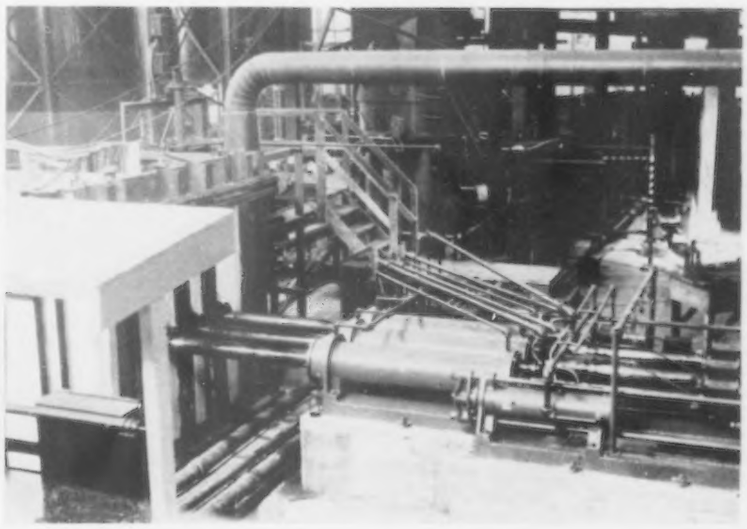
A FEATURE of this high-speed furnace is the atmospheric control which prevents scaling, pitting and decarburization of the work. This is accomplished through the use of a thin transparent curtain of burning gas across the throat of the furnace, preventing entrance of even small amounts of oxygen. Heating elements are Globar, mounted staggered. Hearth plates and side baffles are of silicon-carbide.

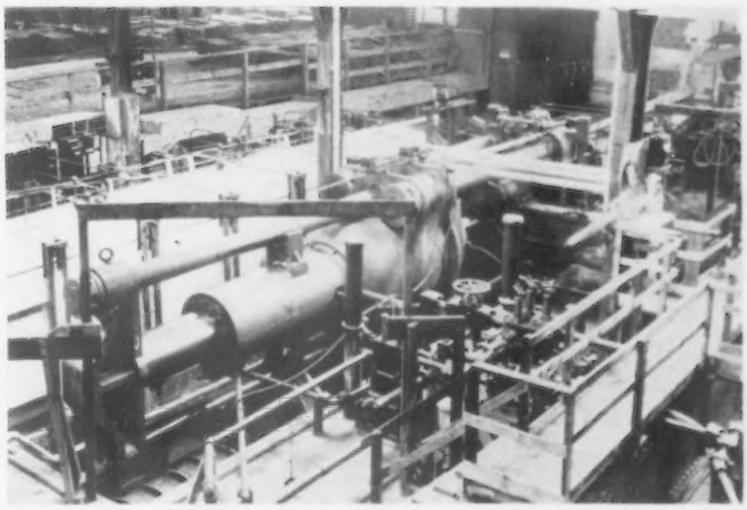
▲ ▲ ▲ (*American Electric Furnace Co.*)

FOR BETTER BUSINESS

Attaining Favorable Cost Levels Provides Profit Insurance



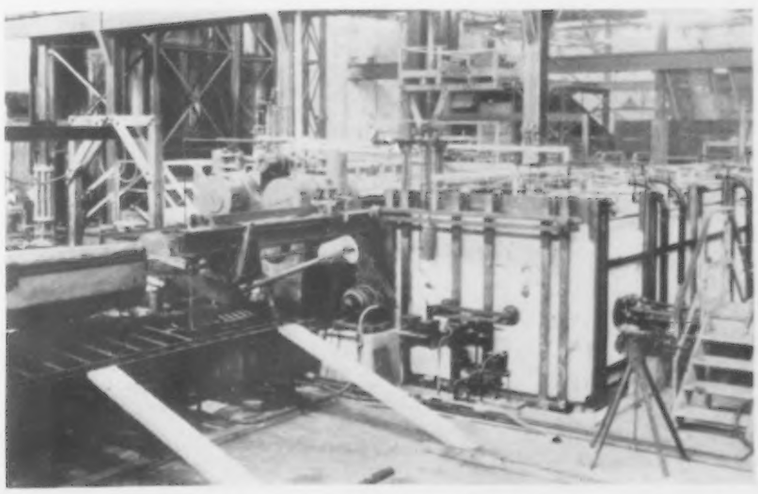




NON-FERROUS BILLET HEATING FURNACE AND EXTRUSION PRESS

CONTROLLED atmosphere 1500 kw. non-ferrous billet heating furnace serving 3000 ton extrusion press. Capacity 22,000 pounds per hour. From charging until extruded, metal is fully protected against oxidation. Handling of work is fully automatic through system of interlocked automatic motion control. A new, unique method of construction insures against breakdown of insulation or sealing jacket by special steam and gas atmosphere.

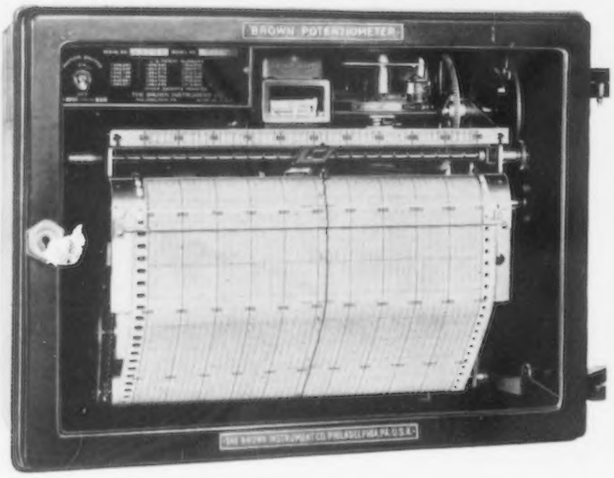
(W. S. Rockwell Co.)



DEVELOPMENTS IN TEMPERATURE CONTROL

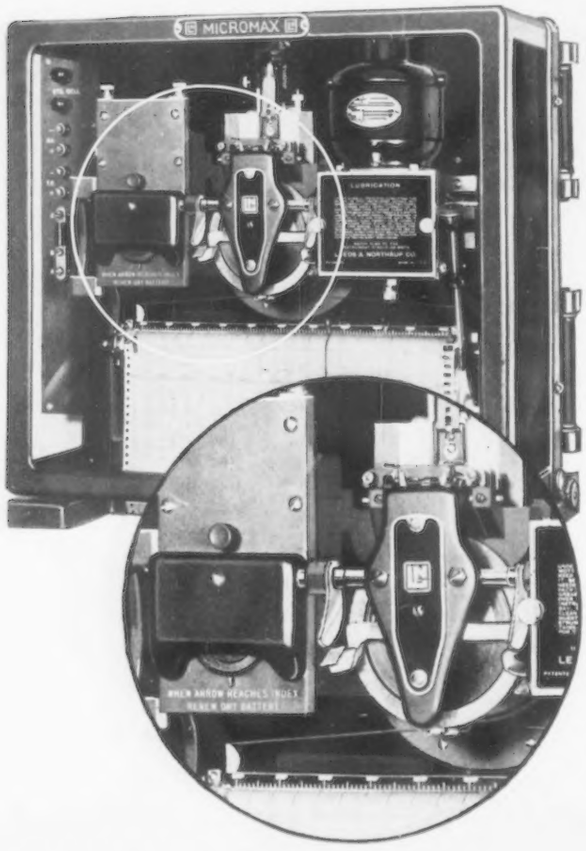
SEVERAL important improvements have been embodied in this redesigned "Tycos" pyrometer control. These result in lighter weight, elimination of possibility of shock or vibration and ease of installation.

(Taylor Instrument Companies)



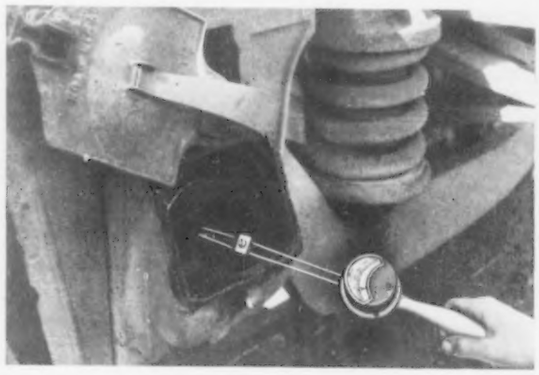
THIS self-balancing potentiometer pyrometer contains a number of improvements, among which is a humidity compensator which prevents errors due to the expansion or contraction of chart paper. Color code provides for multiple recording.

(Brown Instrument Co.)



"MICROMAX" is the name given to this improved potentiometer pyrometer. The instrument standardizes itself at intervals of 45 min. or less. Rapid stepping action is provided and pointer deflections as small as 1/1000 in. are recorded.

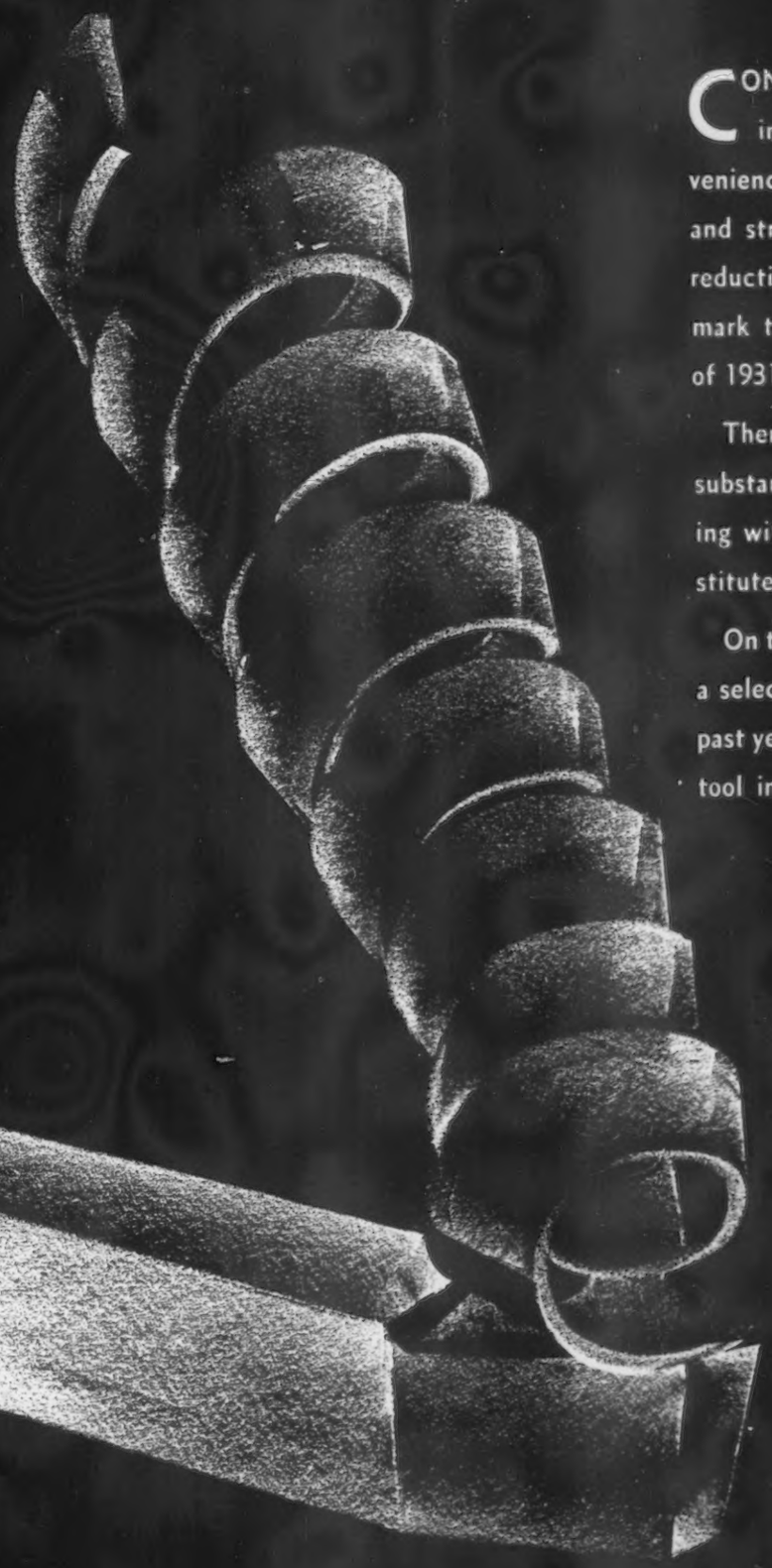
(Leeds & Northrup Co.)



THIS "Pyro Point" is a portable pyrometer which quickly indicates the surface temperature of the bearing or other part to which it is applied. Its design is such that lag has been reduced to a minimum and the readings are almost instantaneous.

(Illinois Testing Laboratories, Inc.)

MACHINING



CONTINUED gains in productivity, in precision, in operating convenience, in mechanical functioning and structural features, as well as in reduction of maintenance liability, mark the machine tool improvements of 1931.

Then, too, there are a number of substantially new tools for metal working with original features which constitute basic improvements.

On the following pages are presented a selected number of examples of the past year's accomplishment in machine tool improvement and redesign.

1931 SET FAST PACE IN MACHINE TOOL DESIGN

By WILLIAM K. STAMETS
President, Machine Tool Dealers' Association
Pittsburgh

▲ ▲ ▲

A SURVEY of the new and improved tools announced in 1931 indicates trends toward better control, increased range in capacity and usefulness, better wearing surfaces, automatic lubrication, and provision for using the new cutting tools which are being developed.

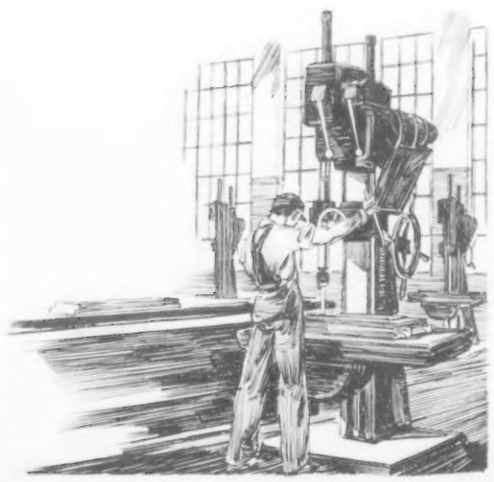
The new designs show an increasing convenience in machine controls, with a broader range of speeds and feeds. Hydraulic applications are numerous in accomplishing this, although there have been important developments in completely automatic electric controls. In this connection the use of electronic tubes may become of growing importance.

Hydraulic devices were increasingly used and better applied, not only for direct feeding and rapid traversing, but also for changing speeds and feeds, chucking, shear hold-downs, etc. Grinding machine manufacturers found hydraulic feeds particularly valuable, judging by the number of new such applications announced.

Increasing range, capacity and usefulness of standard tools is shown in the design of double spindle horizontal boring mills, milling machines with increased weight, power and speed, standard drilling machines with better multiple heads and fixtures, thereby giving some of the advantages to small scale production that were heretofore possible only on quantity output. Multiple chucking machines and high production turning machines have been redesigned and are now available for small and medium size quantities.

THE old idea of maintaining profits by continual increases in volume has been upset by the experience of the past two years. Today, the aim is toward the reestablishment of profits on diminished volumes.

Machine tool design and construction have adapted themselves to this sounder and safer aim and have produced the means for combining flexibility with lowered costs.



There has been a marked increase in the use of welded steel construction for a wide range of applications, including shears, punches, presses, mill equipment and special machines. This welded steel construction is far superior for many of the purposes to which it has been adapted and will result in fewer interruptions because of breakages.

Nitriding is being applied to a greater extent for ways, spindles and other parts and greatly increases the life of wearing surfaces. Anti-friction bearings also are used more extensively and are better applied. Chip removal from high production machines has been facilitated.

The special machines announced show the ability of the builder to serve his customers by understanding their requirements and by producing dependable equipment. Two and three-way and multi-station machines of importance were announced.

The application of the cutting tool to the work, holding and guiding the tool for chatter elimination is of decided importance in this year's designing and shows that the engineers are anticipating an increasing development and use of tungsten and tantalum carbide and special high speed steels.

Regardless of the improvements in the design of machine tools in 1931, no general increase in prices has been made to take care of the new features, and consequently most machine tools are decidedly cheaper, improvements and production considered.

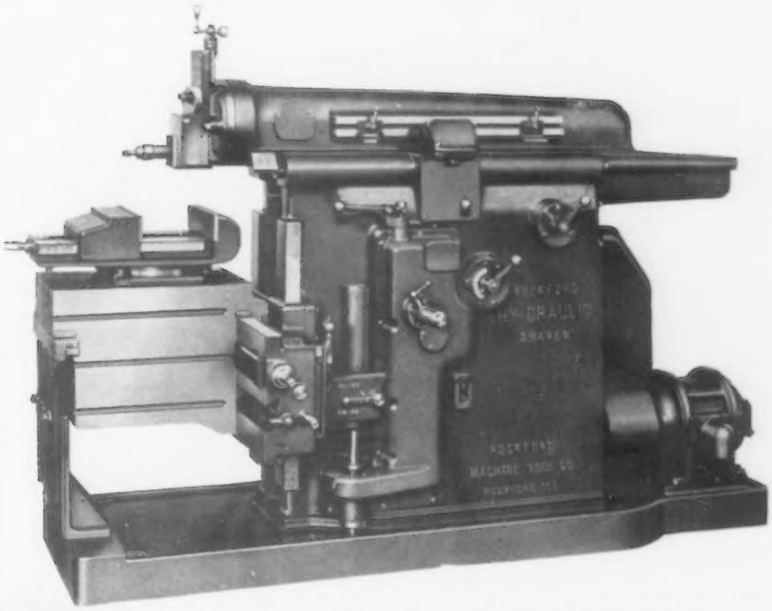
No attempt is made here to list all the important developments in recent designing, but enough have been mentioned to indicate that much existing equipment is thoroughly obsolete. Executives of manufacturing plants are confronted with a serious responsibility. They know of the newly designed and improved equipment that is available and are aware of the obsolete equipment in their plants. They know that to produce work of quality at competitive costs in the future a large part of their equipment must be replaced.

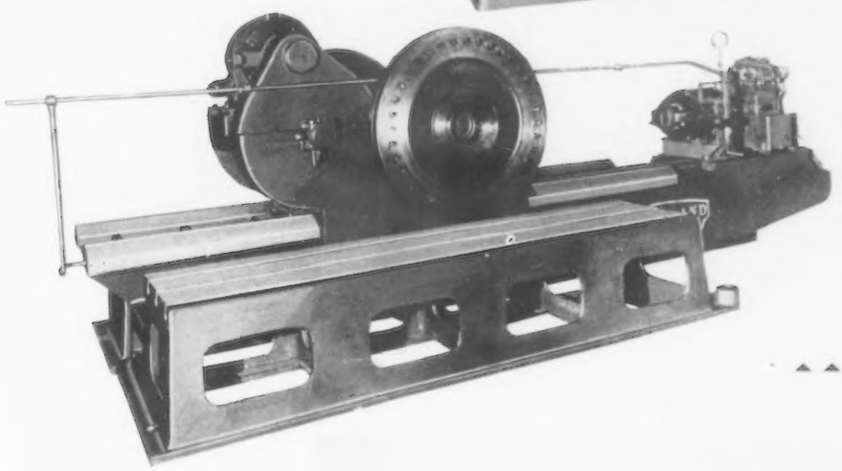
The business papers and other agents of publicity have been employed to bring the need for plant modernization to the attention of stockholders, directors and bankers. Machine tool designers and builders have provided the equipment. Trade papers and distributers have made known its availability. It now behooves the owners and those controlling industrial expenditures to insist that their plants be modernized and to make available the money for that purpose.

TYPICAL OF PLANER AND SHAPER PROGRESS

Intelligent Replacement Is the Key to Future Profits

▲





HYDRAULIC ram drive and feed give smooth rapid cutting and unusually high return speeds on this Hy-Draulic shaper, which operates at 150 strokes a min. Cutting speeds are constant throughout the stroke and instantly adjustable from 0 to 120 ft. a min. Altering stroke length does not change the cutting speed.

(*Rockford Machine Tool Co.*)

▲ ▲ ▲

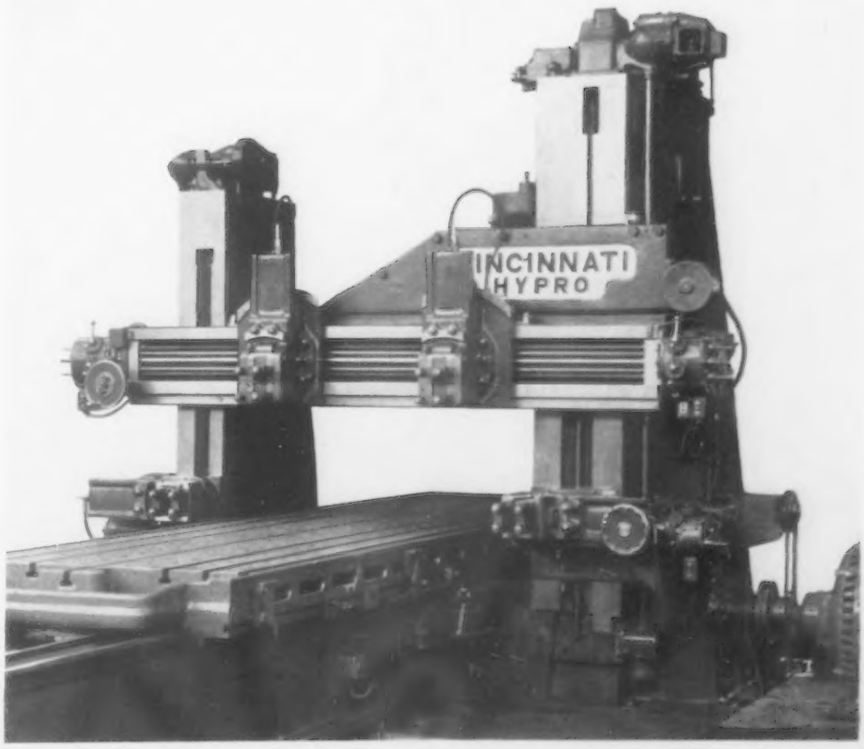
HYDRAULIC feed mechanism on the No. 3 rotary planer shown above is designed to give faster and smoother feeds and faster rapid-traverse in either direction, with greater production and increased life of cutting tools. The cutters run at 60 ft. a min.; feed range is from 1 to 12 in. a min.

(*Cleveland Punch & Shear Works Co.*)

▲ ▲ ▲

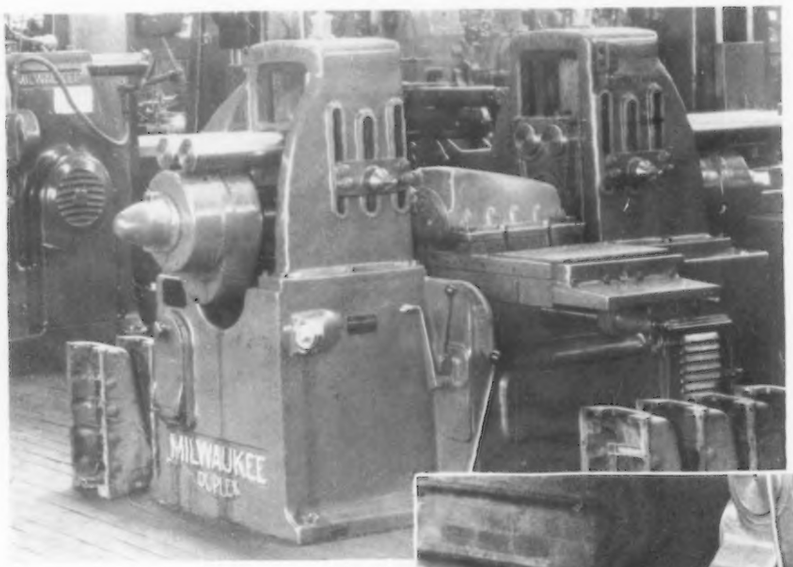
PNEUMATIC lifters raise the tool blocks of this open side planer, thus preventing damage to the tool by dragging over the work on the return stroke. They are actuated by a small air piston in each clapper box.

(*Cincinnati Planer Co.*)



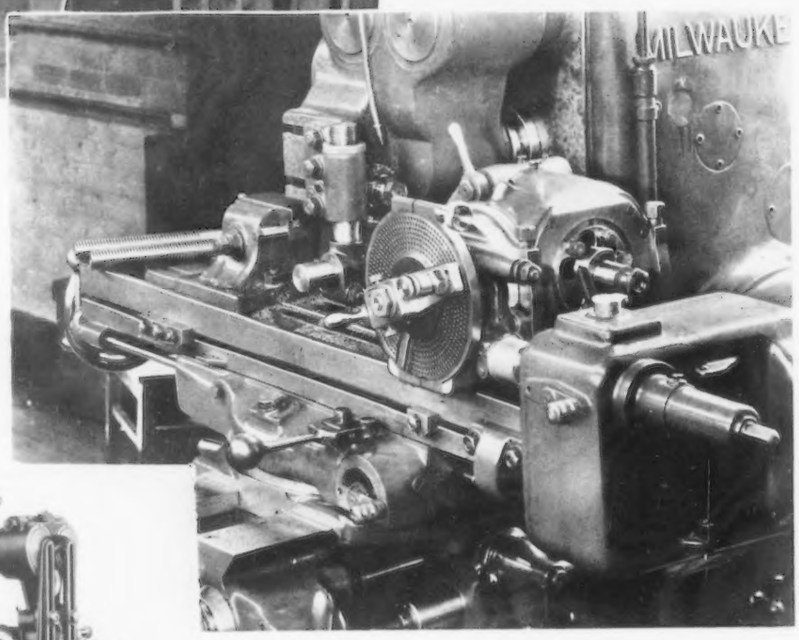
THE MILLER ANTICIPATES

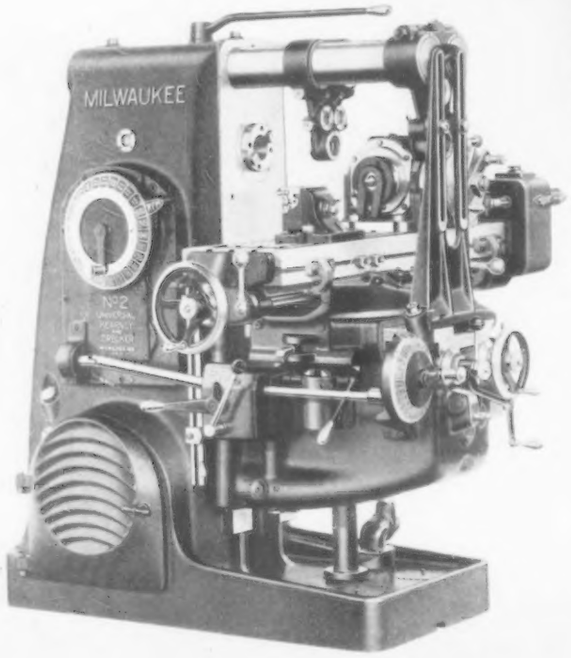
The Times Demand Economy; Improved Machinery Provides It



USING tungsten - carbide cutters, this No. 1830 Milwaukee duplex machine mills both ends of a cast-iron oil pan at a speed of 300 ft. per min. The feed is 26 in. per min. and the depth of cut is 1/8 to 5/32 in. Spindle speeds up to 1000 r.p.m., table feeds up to 100 in. per min. are obtainable.

(*Kearney & Trecker Corpn.*)





THIS new hypoid bevel gear dividing head will divide all numbers up to 500; it will cut more than 40,000 different leads, from 38 threads per in. up to a lead of 2900 in. in one turn. For threads and short spirals having an angle greater than 45 deg. with the axis, a thread milling attachment is used.

(*Kearney & Trecker Corpn.*)

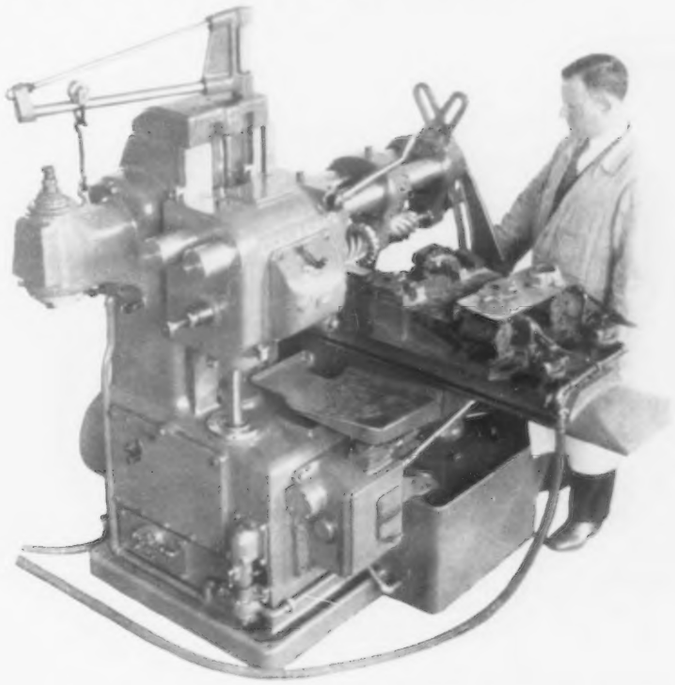
BROADENED speed and feed range and other developments adapting the machine for the new hard-alloy cutting tools feature the new No. 2 knee-type Milwaukee milling machines. Twenty-seven speeds and feeds are obtainable. Other features include hinged arbor support, worm-driven center-bearing spindle, sponson-type knee, and many others that make for unusual strength and operating convenience.

(*Kearney & Trecker Corpn.*)

TOMORROW'S DEMANDS

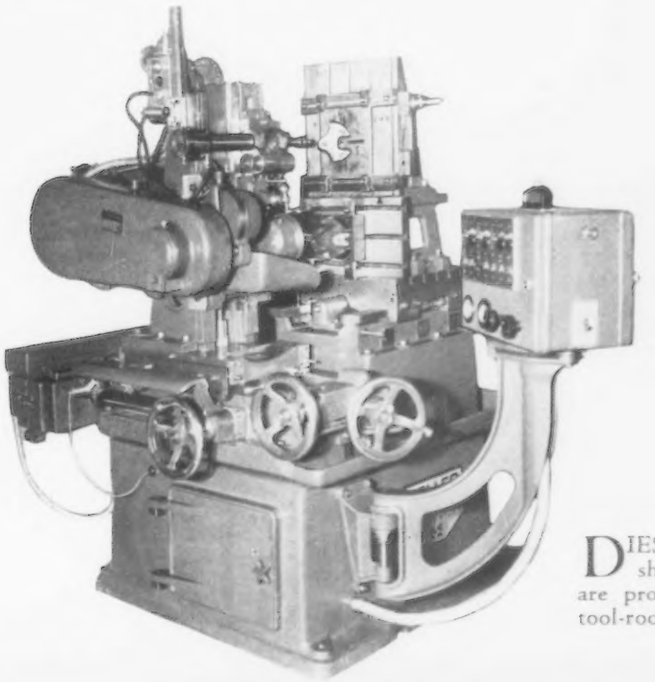
VERTICAL motor drive to the spindle through four-step aluminum pulleys and V-belt is an improved feature of the vertical miller and router shown above, which is used in the manufacture of stamps, stencils and light dies. Heavy column, ball-bearing spindle mounting and a new micrometer stop for accurate control of the cutter are other improvements.

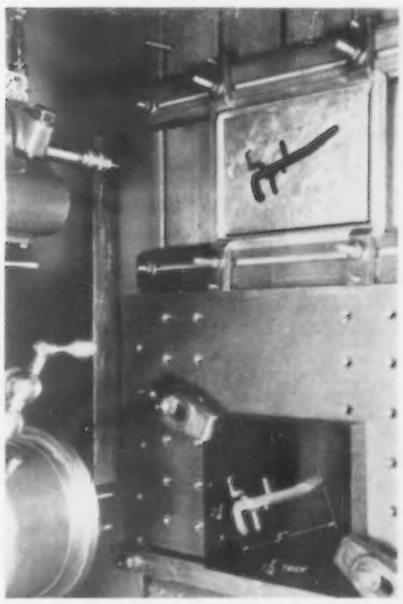
(Reed-Prentice Corpn.)



FACILITIES for rapid set-up adapt this plain milling machine for short-run work, as well as for production runs. Feed and speed changes are each controlled by a single lever. Automatic table operation, in a variety of cycles, is obtained by adjustable dogs.

(Brown & Sharpe Mfg. Co.)





DIES, punches, molds, cams and a variety of odd-shaped pieces that can be milled from templates are produced rapidly on these small Keller automatic tool-room machines. Cutting of a blanking die is shown in close-up view above.

(Pratt & Whitney Co.)

PRECISION GRINDING

NINETEEN THIRTY-ONE has been characterized more by a steady and continuous refinement of previous achievements than by the introduction of radically new methods. One thought which has actuated much of the work which has been done is the realization on the part of the manufacturers making high quality products that the question of finish is very closely associated with that of permanent accuracy, or in other words the more permanent maintenance of the original limits of accuracy.

One large manufacturer of an extremely popular household appliance has instituted a system of selective assembly to limits of 0.0001 in., and the long run guarantee which is given in respect to the functioning of this appliance, and in respect to which noise and wear would be fatal, has automatically brought the question of finish under the most critical review. While it has always been recognized by progressive manufacturers that a well-balanced scheme of tolerances is essential to easy and, therefore, cheap assembly, thorough examination of mechanical components subjected to an intensified wearing test has provided convincing evidence that noise, gas tightness and continuously correct functioning are factors of tolerance control. These, in turn, assuming that the design is adequate, are factors of finish control.

To satisfy the exacting demands of the present-day discriminating buyer, the domestic refrigerator, the automobile, the washing machine, the Victrola, the vacuum cleaner, the sewing machine and the hundred and one other mechanical household appliances—all of these things must operate practically without noise.

Then again, in the broader field of application served by mechanical devices, the feeling has been growing that noise almost invariably means wear, and wear in any form is economic waste. Always assuming that the problems of design have been adequately dealt with, the thought has grown and been accepted as fundamentally sound, that noise and wear in a large measure are preventable and in many cases almost entirely controllable by the accuracy with which the final sizing or finishing operations are performed.

Realizing this trend of the thoughts of the manufacturers and users, both the makers of precision grinding machinery and grinding wheels have redoubled their efforts in an endeavor to perfect their appliances and products.

Increased Accuracy Realized

The control of accuracy in manufacturing, or rather the sizing of work reliably between predetermined limits of accuracy, has progressed under the impetus of economic pressure. The automatic compensation for grinding wheel wear in cylindrical grinding is now an accomplished fact, and quite a large number of manufacturers have installations fitted with this type of equipment.

The gradual disappearance of highly skilled operators, whose judgment and experience in the past have enabled them to produce work within close limits of accuracy, has called for and produced a mechanical substitute which will function with unfailing reliability. In some cases the installations are entirely automatic, the work after it leaves the machine passing under a sizing finger, which automatically registers when the work is produced oversize due to grinding wheel wear, and which at the same time switches in a combined electrical and hydraulic circuit, which, through the aid of mechanical members, automatically compensates on the grinding wheel adjustment for the exact amount of oversize.

In other cases where the work is of such a nature that it is necessary to inspect each piece, a remote control to the grinding machine has been worked out and enables the inspector, by pressing a button, to close in the throat of the machine the necessary amount to bring the work back to the prescribed limits of accuracy.

Although during the past year there have been very few plants operating all of their precision grinding machine equipment, an increased number of the machines in operation have been fitted with dial indicator calipers, which are previously set to a master piece. The older method of cylindrical grinding, both external and internal work, with mechanisms which fed up to an adjustable dead stop, is giving way because of the attractive production times which can be realized by the comparator method of size control.

There are now two domestic manufacturers marketing dial type calipers with bracketing and fixtures designed to enable these calipers to be applied to any make of external cylindrical grinding machine, and the increased favor with which these devices are being received, indicates a realization of their economic merit. In those cases where cylindrical work is being sized by the dead stop method, the leverage of the mechanism controlling size has been increased to the point where consistent accuracy within 0.0002 in. on the diameter can be obtained by relatively unskilled labor.

Finish on Ground Work

Another factor which has had an important bearing on the ease with which accuracy is obtained has been the provision of grinding wheels so bonded that they can attain their maximum rate of metal removal by exerting a greatly reduced pressure on the work. Having regard to the fact that many of the commercial tolerances required on the work produced today are considerably less than the thickness of the oil film supporting the spindle carrying the grinding wheel, it will be realized that the question of wheel pressure is preeminently important in accuracy control.

An endeavor has been made in the foregoing paragraphs to show the

*Also, chairman of the Cincinnati Local Section, and secretary of the Machine Shop Practice Division of the American Society of Mechanical Engineers.

IN 1931 AND 1932

By R. E. W. HARRISON
Engineering Sales Director,
Cincinnati Grinders, Inc.

relation which exists between accuracy and finish, and the thought on this matter has progressed to the point where a special committee of the American Society of Mechanical Engineers has been appointed to make a recommendation to the standards council of the American Standards Association, regarding the desirability of setting up national standards of finish and an appropriate method of designating these finishes. Already a number of manufacturers producing work to the closest limits of accuracy have found it necessary to devise schemes of their own, whereby their engineering departments can correlate their requirements with those of the production department in respect to the degree of finish required on each specific piece of work.

Another aspect which has received more than a little attention is the thought that in many elements, particularly where the factor of safety is necessarily on the low side, the quality of finish has a distinct bearing on the ultimate strength of the piece. Hitherto quality designations such as rough, commercial, smooth, fine, mirror, extra fine, ultra-fine, etc., have been used to describe certain types of finish, and as there has been no yardstick available, the results have been a matter of opinion, which, like all matters of opinion, is a prolific source of dispute.

Much has been done in the way of research to establish the correct procedure in obtaining the various qualities of finish, and the major conclusion which has grown out of this has been that there is no royal road to a high finish, and that it has to be built up by successive stages, just as real accuracy has to be built up by successive stages on any large quantity manufacturing job.

The previously proposed scale of tolerances set up for shafts and holes is now under critical review, and it seems likely that certain types or qualities of finish will have to be designated for the finer qualities of fits.

The grinding wheel manufacturers have contributed greatly in the search for the most easily controlled and cheaply obtained highest quality of finish, the results being seen in the placing on the market of wheels of finer grits and more uniform grading than ever before, coupled with relatively free-cutting qualities, which make these grinding wheels infinitely more reliable than those available twelve months back.

Grinding Wheels of Greater Reliability

The rate of production available on the modern precision grinding machine is dependent upon the two major factors of rate of metal removal and machine and work handling facilities. Never before has so much attention been given to the thought that a cutting tool, no matter what its nature, is only realizing its economic worth when the cutting tool is actually cutting. With this thought in mind, much has been done by the grinding machine manufacturers to reduce the idle or non-grinding time. In response to the need for improvement in the latter item, horsepowers have been consistently increased. Based on the thought that the available rate of metal removal is very definitely controlled by the available horsepower, the horsepowers of the main drive motors have been steadily increased up to the limits imposed by the strength of the grinding wheel or the nature of the work.

Here again mention should be made of the fact that with the provision of freer cutting wheels with their structures controlled so that the maximum rate of metal removal can be obtained with the minimum pressure and heat, much improvement in the rate of output has been registered on a wide variety of work.

Other Factors in Increased Production

The provision of automatic hoppers for both infeed and through-feed types of work has been the major factor in increasing the output per man-hour. Here again is provided another example of the relationship which exists between the factors of accuracy and production, inasmuch as the consistency with which work is fed from a mechanical hopper into the machine has a very beneficial effect on the accuracy of the product, due to the elimination of the human element, as it affects pressure on the grinding wheel, on the machine structure and on the work.

Another phase of the production element has been dealt with in the conservation of man power effected by improvements in machines permitting a multiplicity of diameters to be ground on a production basis without the necessity of removing the work from the machine. In one case in particular, where a cylindrical grinding machine was employed grinding 20-hp. electric-motor armature shafts, a conservative estimate disclosed the fact that by obviating three lifts into and out of the machine, the operator is relieved of the burden of actually lifting a total of about 5 tons in an 8-hr. day. It will be appreciated that this improvement also has a bearing on the human safety factor due to reduced fatigue.

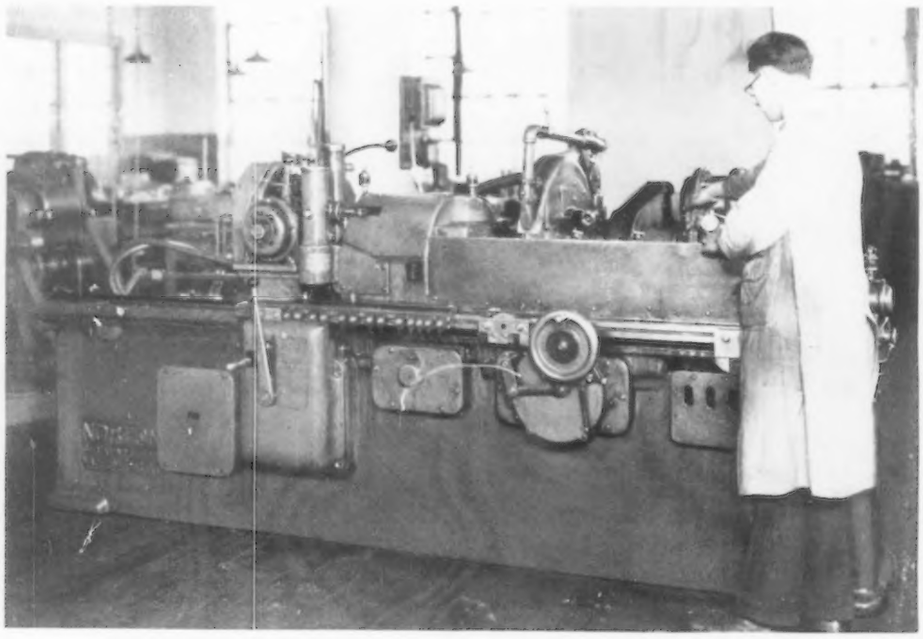
In another case the axle shaft of a well-known make of car is now being ground on four of its cylindrical surfaces with four grinding wheels operating simultaneously, whereas previously each diameter was ground to size by an individual machine, each with its own operator. In this case the work is fed into the hydraulic loading mechanism of the machine, and the only physical exertion required of the operator is the movement of a single lever to start the work cycle.

While at the present time it may seem out of place to some economists to stress the virtues of labor-saving equipment, the fact remains that such equipment in the vast majority of cases actually produces more accurate work at a vastly increased rate of production.

One of the greatest deterrents to the highest rate of production has always been the fear, on the part

(Continued on page 124)

GRINDING LOOKS TO ITS

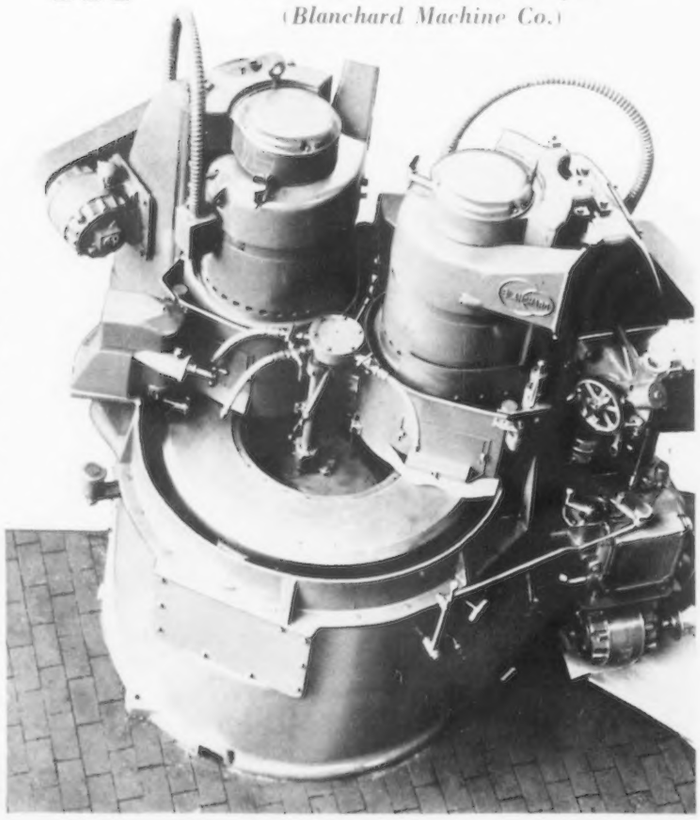


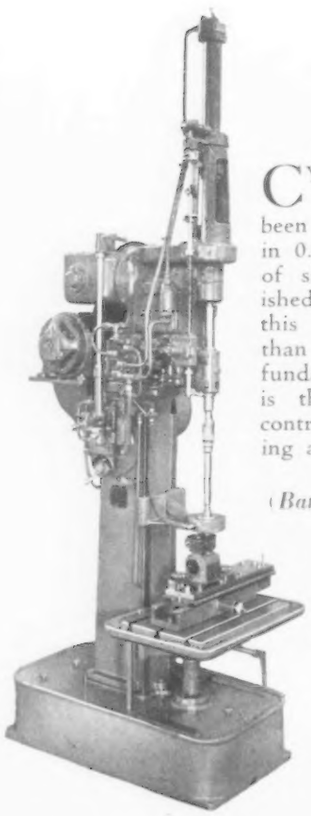
INCREASED production capacity without sacrifice of accuracy is a feature of this new automatic cam grinding machine. Being automatic, one operator can attend several machines, loading and unloading and starting being the only manual operations. Positive duplication is provided by master cams and by stops on the wheel slides.

(Norton Co.)

THIS machine extends the application of the Blanchard automatic surface grinder to work having more stock than a single wheel will remove in one pass and to finer finish and greater accuracy than can be obtained through a single wheel. The amount removed by each wheel is controlled by its individual automatic caliper.

(Blanchard Machine Co.)





CYLINDERS and bores that have been reamed to within 0.001 to 0.002 in. of size may be finished by honing on this machine in less than one minute. A fundamental feature is the hydraulically controlled reciprocating and rotating spindle.

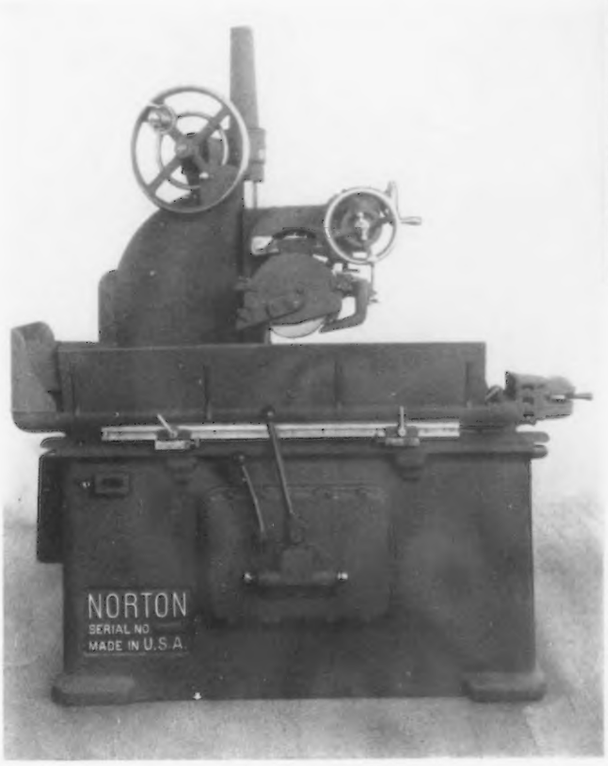
(Barnes Drill Co.)

FUTURE

Cost Reduction Always Spells Economy

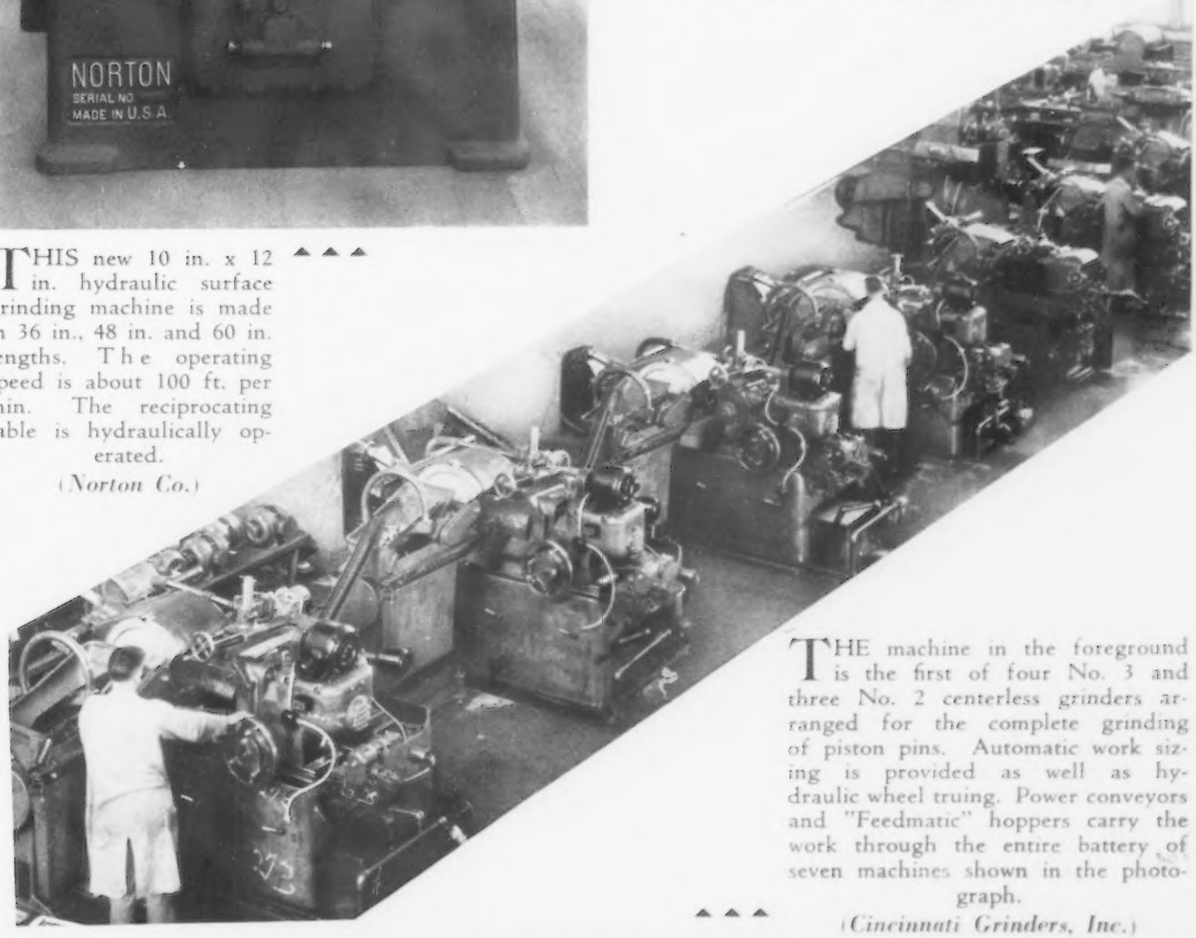
DESIGNED for flexibility combined with suitability for mass production of small parts, this 6 in. by 18 in. plain grinder is equipped with hydraulic table traverse permitting speeds from 6 in. to 240 in. per min. Accessibility as well as ease of operation are emphasized.

(Landis Tool Co.)



THIS new 10 in. x 12 in. hydraulic surface grinding machine is made in 36 in., 48 in. and 60 in. lengths. The operating speed is about 100 ft. per min. The reciprocating table is hydraulically operated.

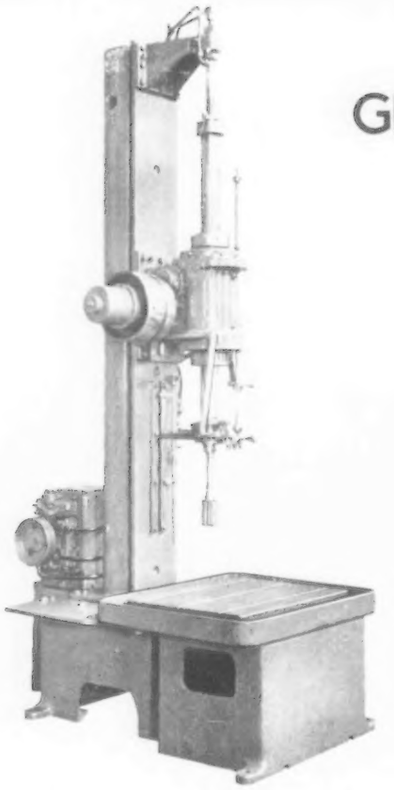
(Norton Co.)



THE machine in the foreground is the first of four No. 3 and three No. 2 centerless grinders arranged for the complete grinding of piston pins. Automatic work sizing is provided as well as hydraulic wheel truing. Power conveyors and "Feedmatic" hoppers carry the work through the entire battery of seven machines shown in the photograph.

(Cincinnati Grinders, Inc.)

GRINDING LOOKS TO ITS FUTURE



FABRICATED steel construction and a combined hydraulic cylinder and spindle feature this No. 13 "Hole-Hog" single spindle lapping and honing machine. Spindle stroke is adjustable to a maximum of 24 in.

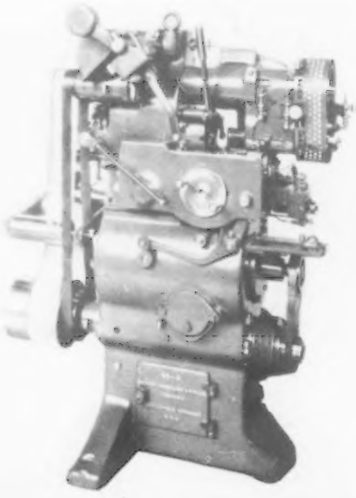
(Moline Tool Co.)

THIS new model MV-500 honing machine is designed for large motor cylinders. It is non-hydraulic, has four reciprocating and two rotating speeds and will accommodate cylinders from $1\frac{1}{2}$ to 3 in. diameter and up to $15\frac{1}{2}$ in. long.

(Hutto Engineering Co., Inc.)

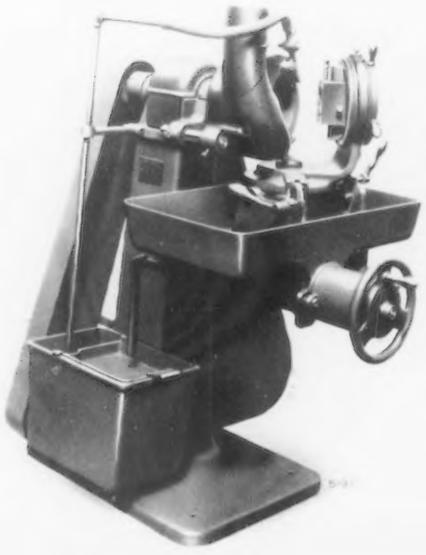
THIS tool grinder was particularly designed for grinding the new tungsten carbide tools, where results in cost are highly dependent upon proper tool angles. Charts are provided with the machine giving settings for high speed and cemented carbide tools.

(Gisholt Machine Co.)



AN electrical sizing device is a feature of this chucking grinder (left). It operates through a carbon washer, mounted beside the wheel, and a sizing ring mounted in the chuck. Contact causes the feed to back off a few thousandths, stopping the grinding.

(Bryant Chucking Grinder Co.)



1931 ADDS TO OUR BROACHING MACHINES

USING from one to three broaches, this Cyclematic broaching machine will complete one cycle in from 8.4 to 19.0 sec., exclusive of loading time and depending upon the length of stroke and the cutting speed employed. It is powered by an Oilgear hydraulic combination pump unit with stroke adjustment for varying the cutting speed. Models are made having normal pulling capacities of 12,000, 26,000 and 44,000 lb.; maximum strokes of 42, 48 and 54 in.

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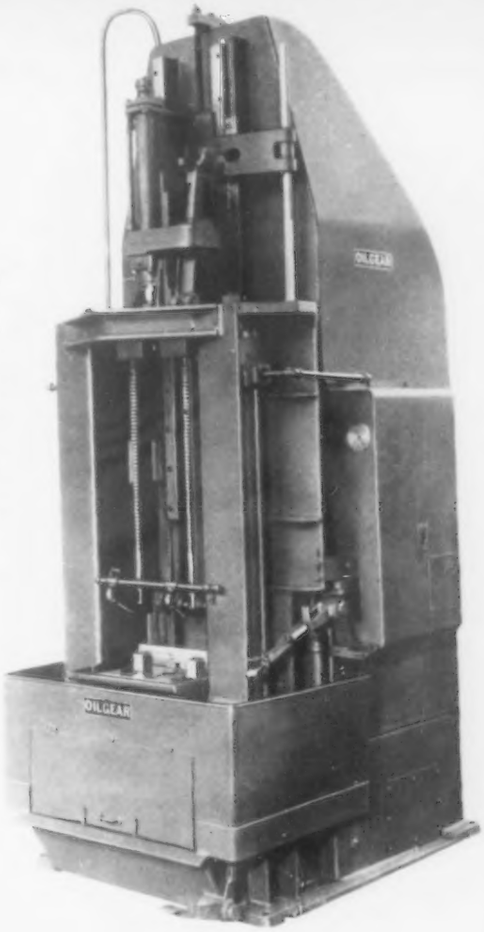
(Oilgear Co.)



WELL-KNOWN advantages of broaching as a machining method for certain types of quantity production can be secured for a wide variety of work by use of this surface broaching machine. There are two broach slides driven through a rack by a spiral pinion. When one slide is driven down on the cutting stroke the other is going up; this results in a continuous cutting operation. Two sizes are offered, one capable of removing 3.3 cu. in., the other 8.6 cu. in., of mild steel a minute.

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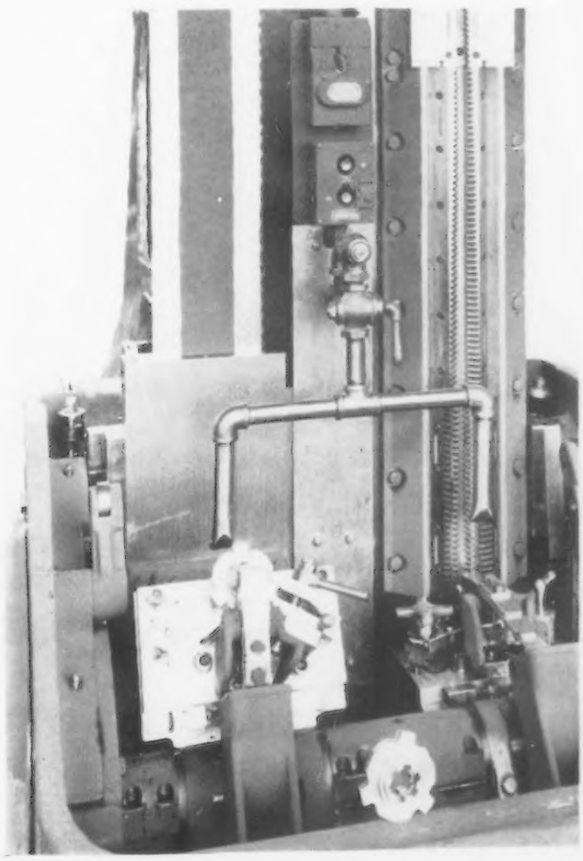
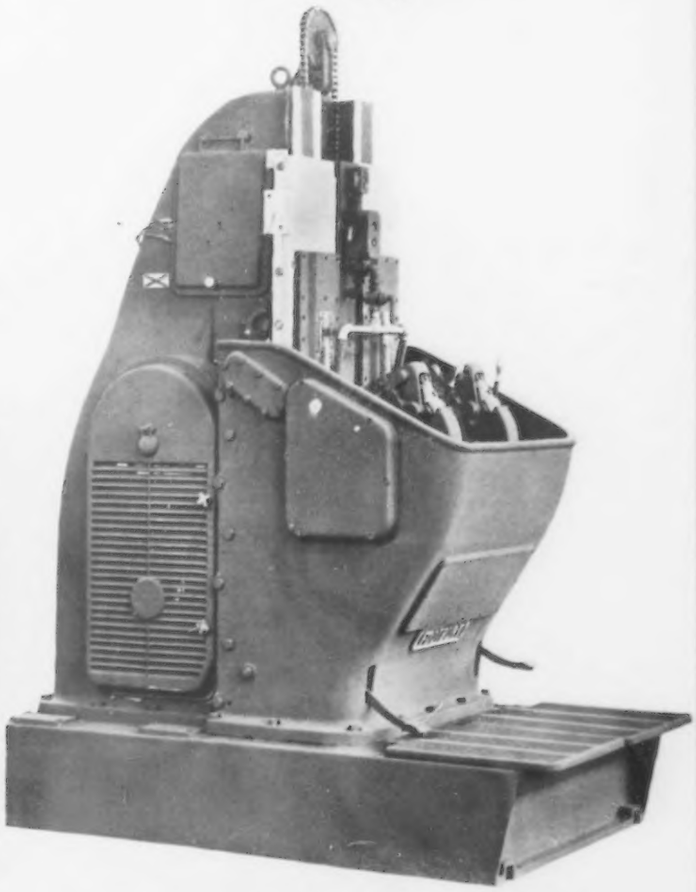
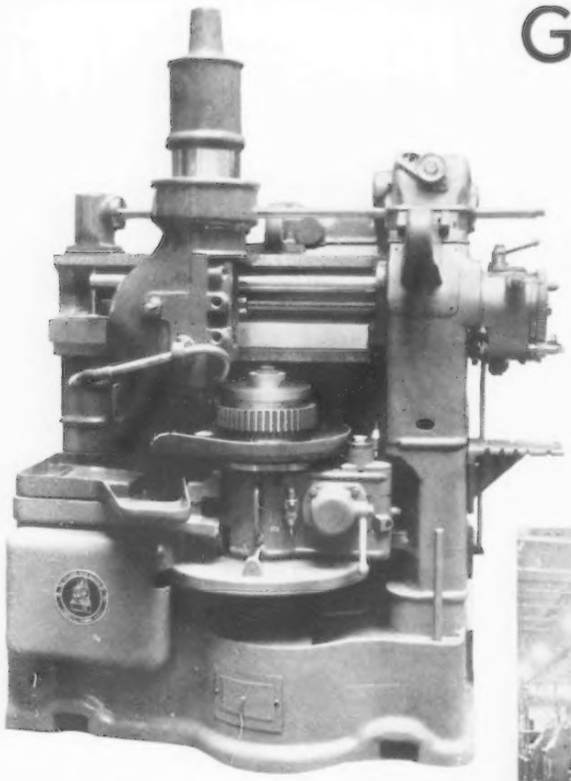
(Foote-Burt Co.)



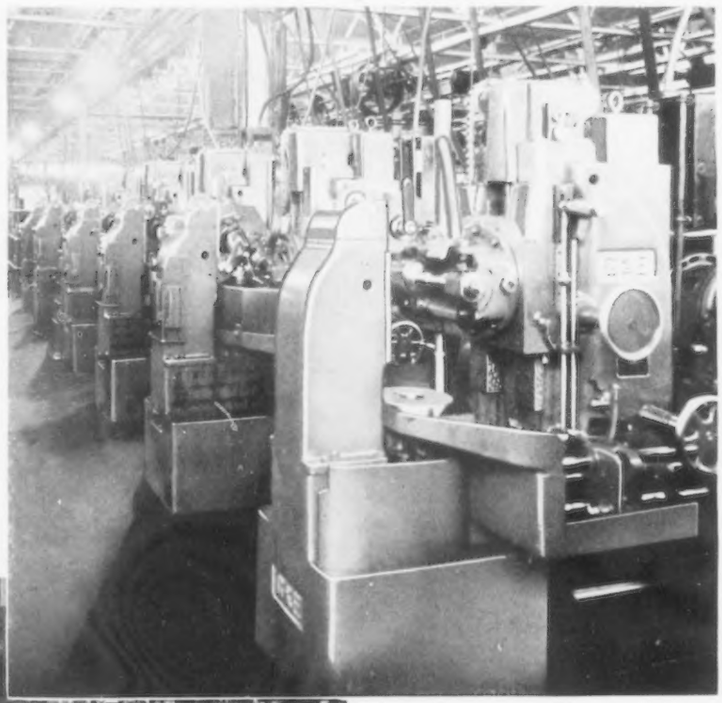


GEAR MAKING KEEPS



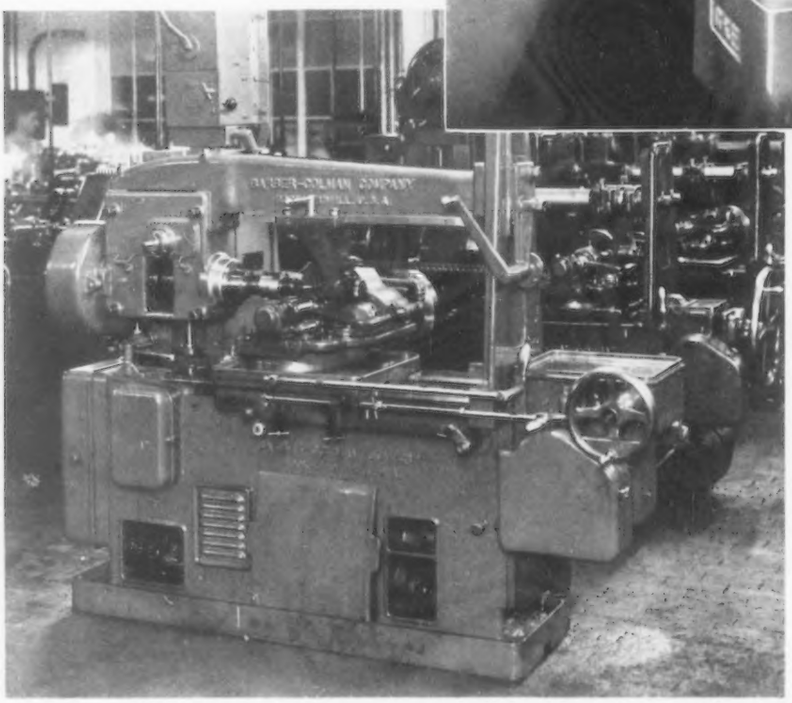
SEVERAL new features of design characterize this revision of the 6-A type of gear shaper, which is known as the 64A type. One of these is the provision of a special apron of heavy design, accommodating a large work spindle and permitting the cutting of gears integral with shanks. The machine is obtainable with either 5-in. or 3-in. strokes. Will cut spur, helical, internal and external herringbone gears, and especially useful for gears on shanks.

(Fellows Gear Shaper Co.)



THIS new type A hobbing machine (below) is suitable for spur and helical gears and other hobbed forms. Greater accuracy has been secured by the use of finer indexing means, and the capacity has been enlarged both as to diameter and length of work. An automatic "stabilizer" eliminates backlash from the feed screw.

(Barber-Colman Co.)

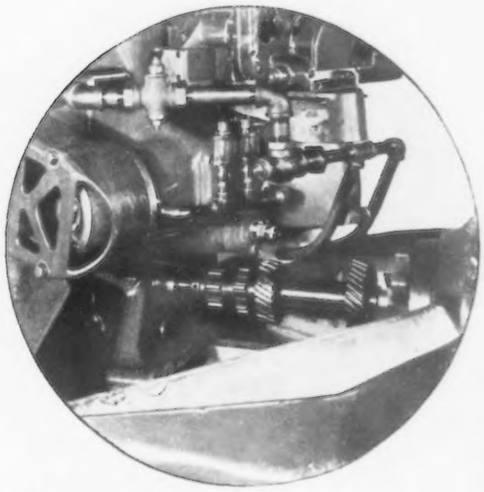


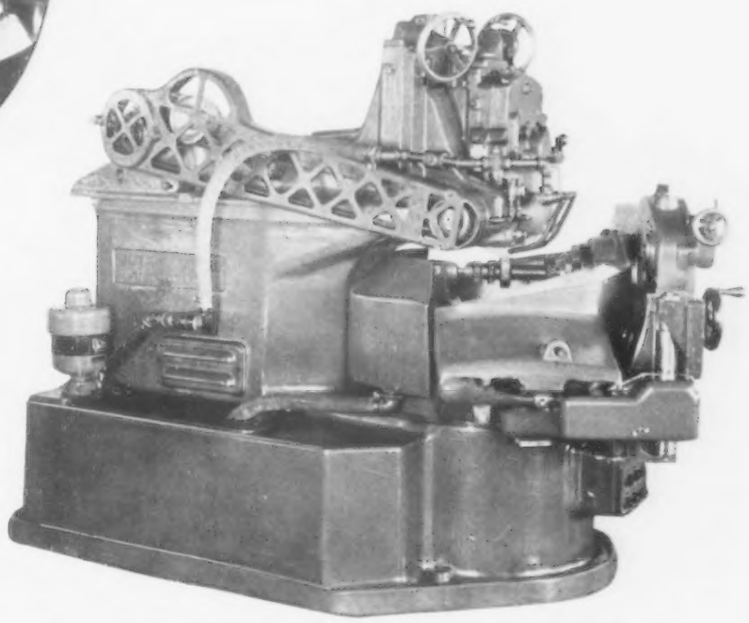
DEVELOPED especially for the production of single helical and built up herringbone gears used in silent and synchro-mesh transmissions, the new 12H manufacturing hobber shown above is equally suitable for other fine pitch gears. It is made in two types, the 12H, which is rated for 5 pitch in steel and the 12H heavy, rated for 4 pitch. Both machines employ the vertical cutting principle and the major features of construction are similar in each. An 180 deg. angular adjustment of the swivel cutter permits the cutting of either right or left hand helical gears of any tooth angle.

(Gould & Eberhardt)

PACE WITH PROGRESS

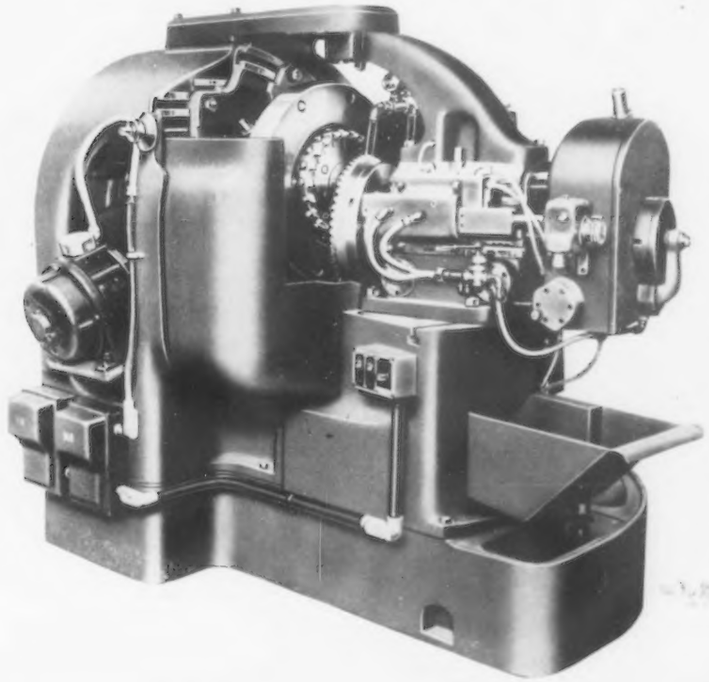
Better Tools Are Ready for Bigger and Better Business





THE P & W helical gear grinder, shown in the two accompanying views, was designed to eliminate the extra cost margin which has prevented the fullest adoption of ground helical gears. The result has been a mechanism for finishing either spur or helical gears by grinding at a cost as low or lower than other existing methods of gear finishing. The principle employed is that of generating the involute, the grinding wheel corresponding to the basic rack. Both sides of a gear tooth space can be ground in one operation. The work is indexed automatically and the machine stops automatically when all teeth are finished.

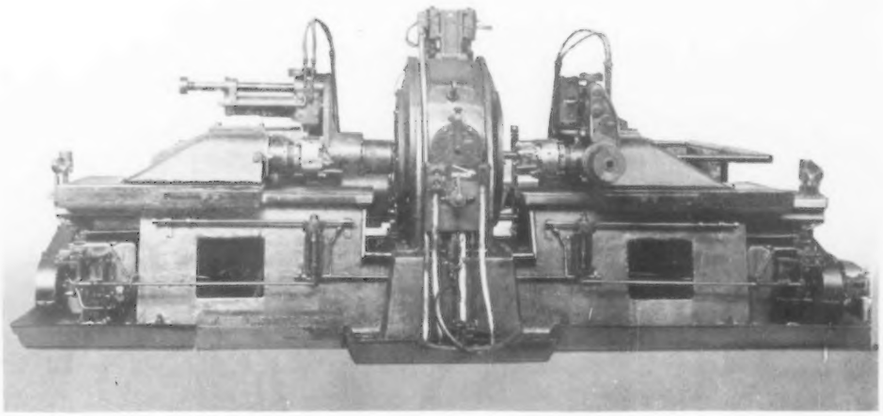
(Pratt & Whitney Co.)



THROUGH exceptional rigidity and by increasing the automaticity, the designers of these new spiral bevel gear roughers have been able to reduce, by 60 per cent, the time required for roughing such gears. Feed, chucking and releasing are all hydraulically controlled. While the cut is taking place all bearing and guide surfaces except the cutter spindle feed sleeve movement are rigidly clamped. Two sizes of this design are available, No. 10 and No. 20, the latter being shown at left.

(Gleason Works)

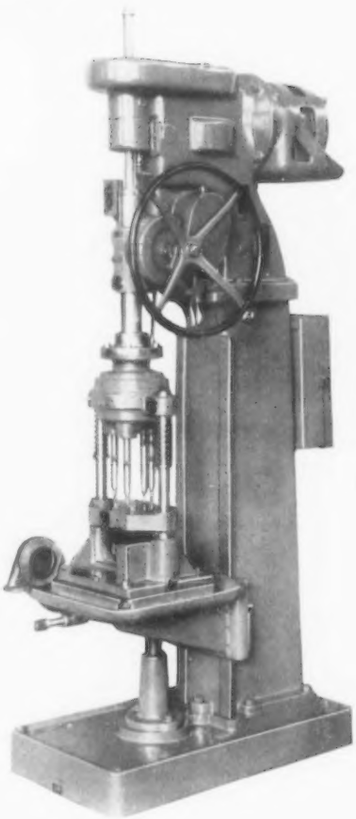
DRILLING AND BORING MACHINES



Cost Reduction Is the Antidote for "Hard Times"

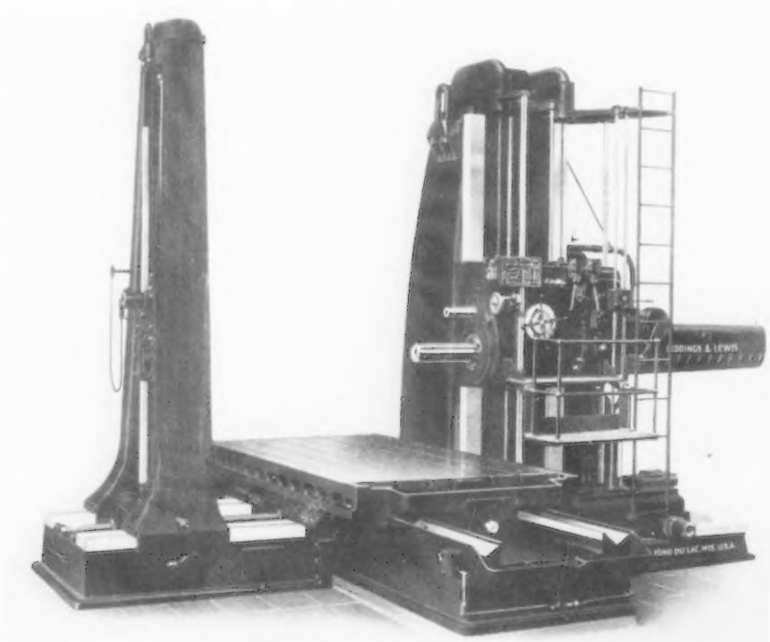
RAPID production in boring and facing pipe couplings and similar taper and straight bored work features this double end, center drive boring machine. A record has been attained by it of boring a 6⅝ in. drill pipe coupling, grade D, in a floor to floor time of one minute and 26 seconds. Automatically positioning loading and unloading arms are provided.

(William K. Stamets)



THIS planer type of two spindle boring, drilling and milling machine has a 144 in. vertical adjustment of the column head. The end support block moves in unison with the head, and the head, column and base mechanisms move along a runway at right angles to the table. Table and floor type machines, not shown here, are companion types of the new series.

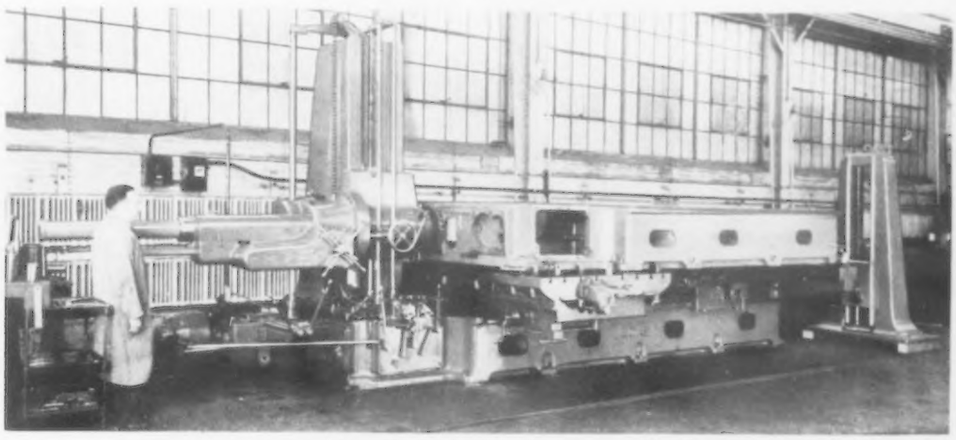
(Giddings & Lewis Machine Tool Co.)



FLEXIBILITY is combined with special purpose productive capacity in this new S-201 self oiling all geared drilling machine. Auxiliary heads provide the special purpose feature. In the accompanying picture, one of these machines is shown as tooled for drilling the side of a pump body.

(Barnes Drill Co.)

SHOW POWER AND FLEXIBILITY

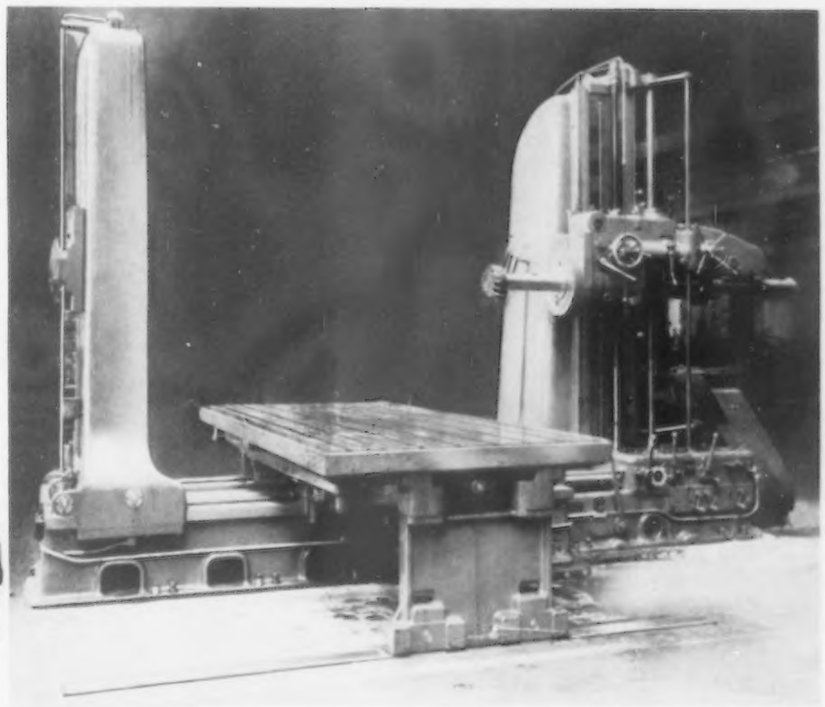


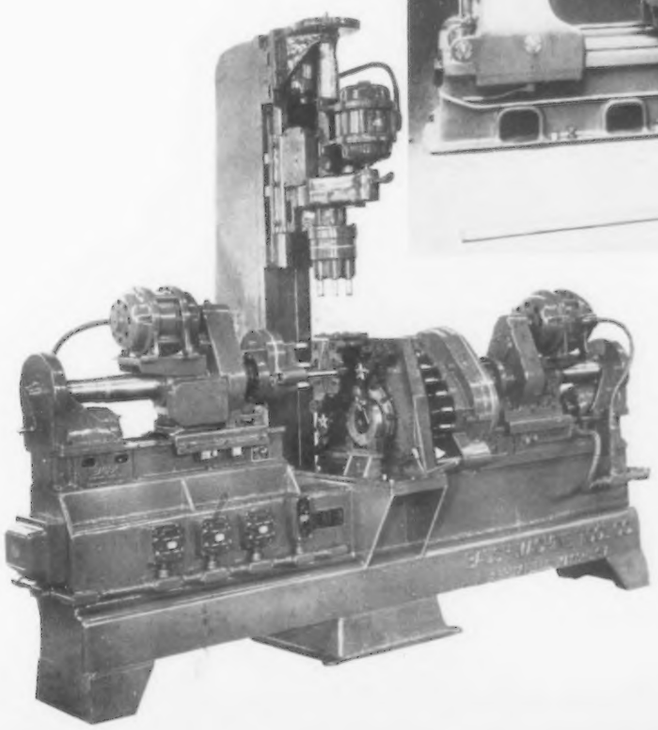
THIS No. 50 universal boring machine (below) is one of the latest developments in this type of equipment. An exceptionally wide bed is featured, being 60 in. on the floor and with four ways.

(Universal Boring Machine Co.)

THE growing demand for greater cross adjustment and vertical range was met in the design of this No. 50 Lucas horizontal boring machine. In the above illustration, the machine is shown milling the pads on the end of another boring machine bed.

(Lucas Machine Tool Co.)





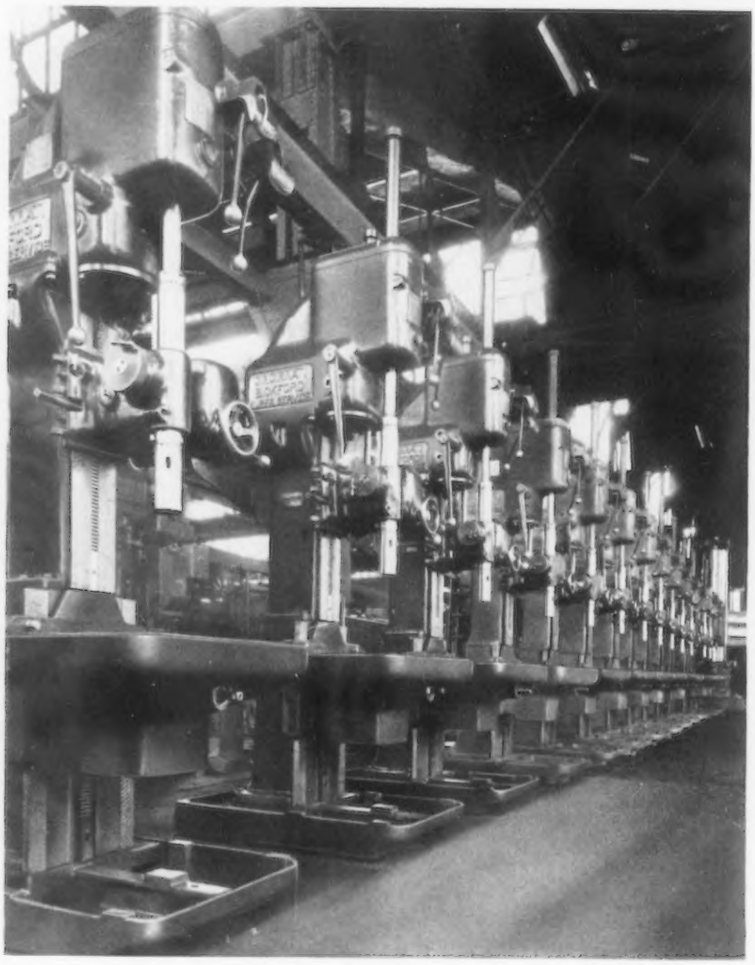
THE accompanying picture shows an installation of 3-way all electric drill units built on a special horizontal bed and vertical column. The outfit is at work on a crankcase front cover A broad range of combinations is possible with these units, which provide automatic production cycles and quick return through motor control. Single or multi-spindle operation is secured by simply changing heads.

(Baush Machine Tool Co.)

DRILLING AND BORING MACHINES

BUILT as a driller, a tapper, or a combination of both, this multiple machine is provided with a wide range of adjustments. It has a capacity of ten ¼ in. drills, or ten 3/16 in. taps in mild steel.

(National Automatic Tool Co.)



A REDUCTION in drilling time averaging 20 per cent is claimed for these "Super Service" drilling machines on general purpose work. This is effected by rigidity, convenience of operating control and extremely flexible speed and feed selection.

(Cincinnati Bickford Tool Co.)

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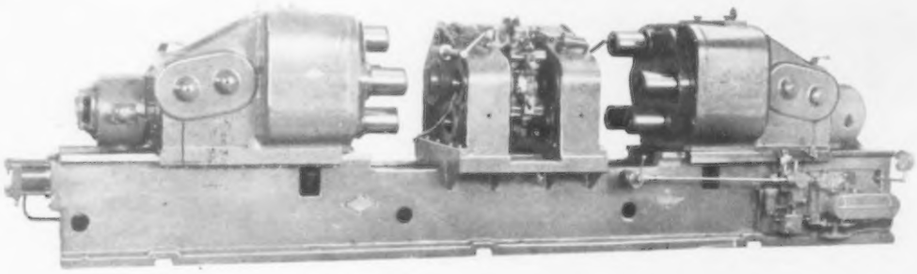
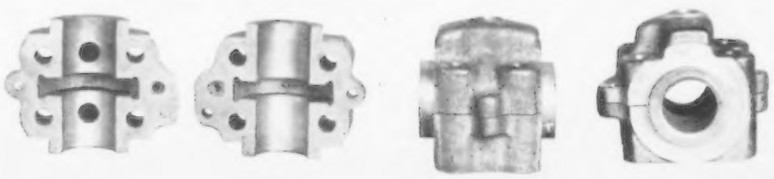
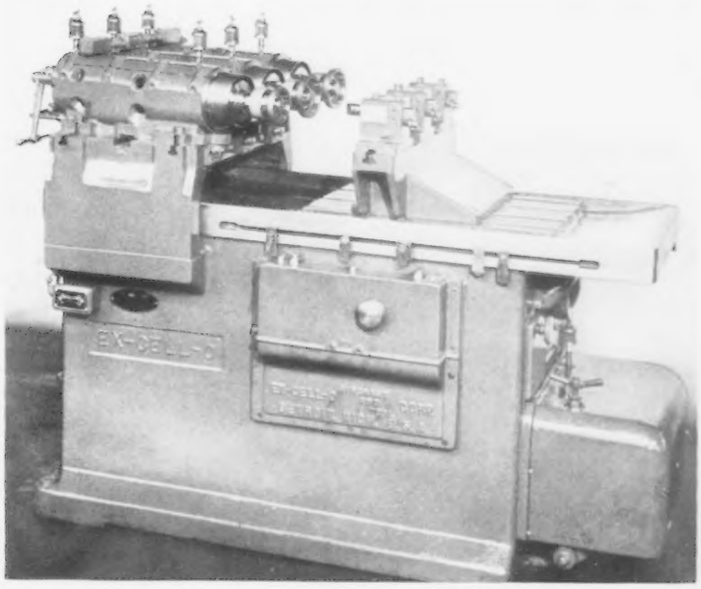


THIS double end, horizontal boring machine replaced four lathes and four operators, giving greater production and more accuracy. At each index of the six station work drum, one part, such as illustrated, is finished. The operations include core drilling, rough turning and facing, semi-finish boring, finish turning and facing, chamfering, rough and finish recessing and final reaming.

(Rockford Drilling Machine Co.)

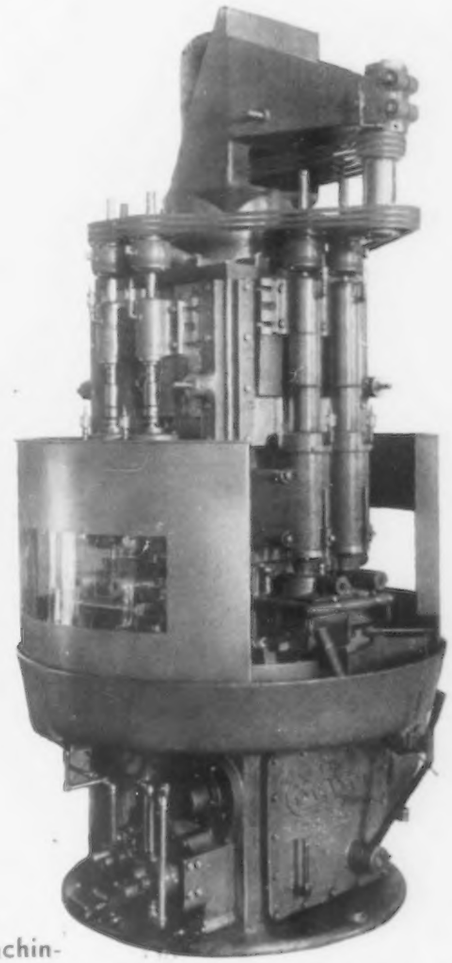


SHOW POWER AND FLEXIBILITY



THIS compact precision boring machine is especially adapted for the production of pistons, connecting rods, transmission gears, motor end frames, air valves and similar parts. Diamond tools are used. In the illustration shown, rear synchronizing cones of brass are being bored and tapered at an 80 per cent efficiency rate of 300 pieces per hour.

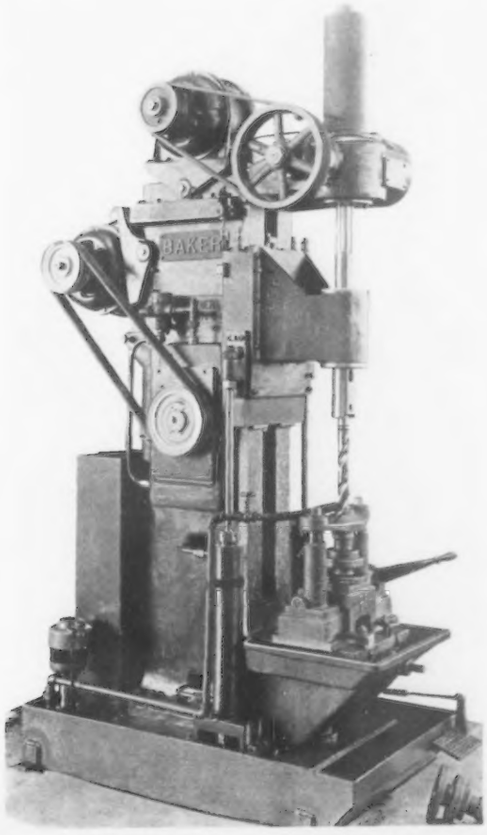
(Ex-Cell-O Aircraft & Tool Corpn.)



THIS vertical 4 station diamond tool boring machine of the revolving turret type was designed for rapid and accurate production of bearing holes in connecting rods, pistons, bushings, valves, refrigerator units, etc. It is completely automatic in action. The unit in the illustration is producing connecting rod bores at the rate of 10 per minute.

(Automatic Machine Co.)

Profit-Making Machinery Is the Soundest Tangible Asset

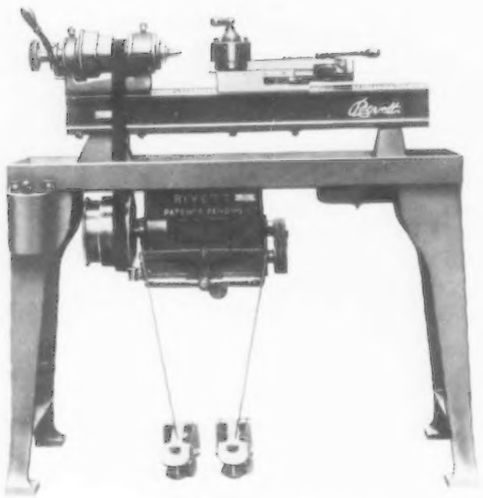


FLEXIBILITY, simplicity and ruggedness are the aims in the design of this new No. 4-VH oilfeed drilling and boring machine. The design is adapted either for single spindle drilling or boring, as shown, or in connection with an indexing table for successive operations. The set up shown is for drilling an automobile cluster gear. Speed and feed capacities are provided to attain the limit of cutting tools.

(Baker Bros., Inc.)

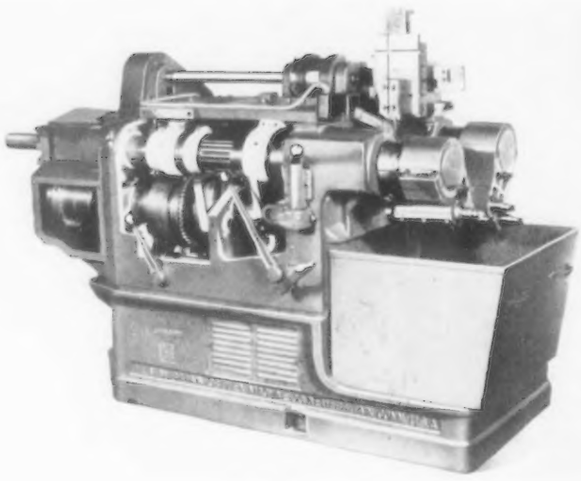
FASTER AND HEAVIER

Prosperity Is Built Through Progressive Mechanization



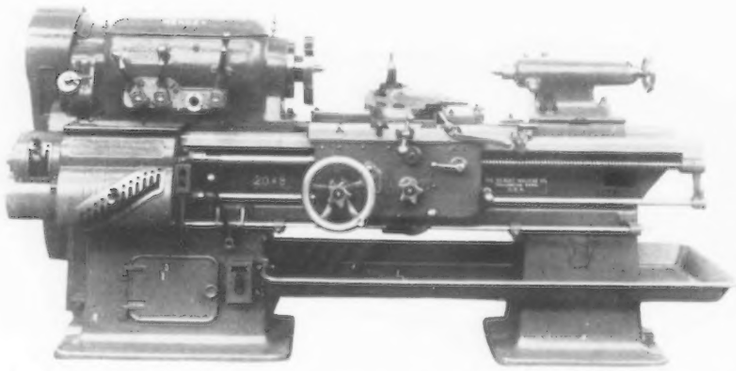
WITH 12 speeds, 200 to 4600 r.p.m., forward and reverse, this precision preloaded ball-bearing bench lathe is adapted not only for tool-room work but for small high-speed production jobs using tungsten-carbide or other hard alloy cutting tools. The compact speed box motor drive is self-contained, is entirely inclosed and is splash lubricated.

(Rivett Lathe & Grinder Corpn.)



HEAVY construction, rigid tool mounting, heavy feeds and automatic operation adapt this 4¾-in. single-spindle tube machine for rapid and accurate production. The tools are carried in arms at the end of heavy sliding bars. A pair of camshafts give these tool-slides the required longitudinal and oscillating movements and the tool-slides have fast motion for positioning the tools and slow motion for feeding them.

(New Britain-Gridley Machine Co.)

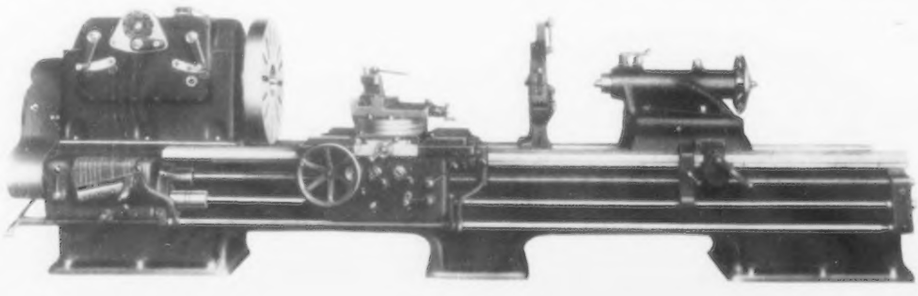


THE spindle of this new 20-in. swing, 12-speed geared-head lathe is mounted on anti-friction bearings of pre-loaded type. Advantages include permanent alinement of the spindle, as the bearings may be replaced at any time without changes in the housing.

(Hendey Machine Co.)

DIRECT-READING 16 speed control; fully inclosed anti-friction, self-oiling gear box; anti-friction end gearing; anti-friction centrally oiled apron; are features of the new Sidney Tritrol 30 and 36-in. heavy-duty engine lathes. The carriage is guided on the bed by large V's front and back and a wide flat bearing is placed under the bridge.

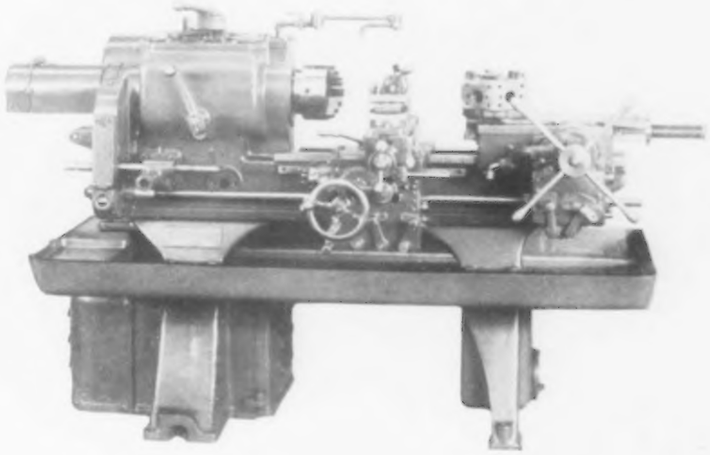
(Joseph T. Ryerson & Son, Inc.)

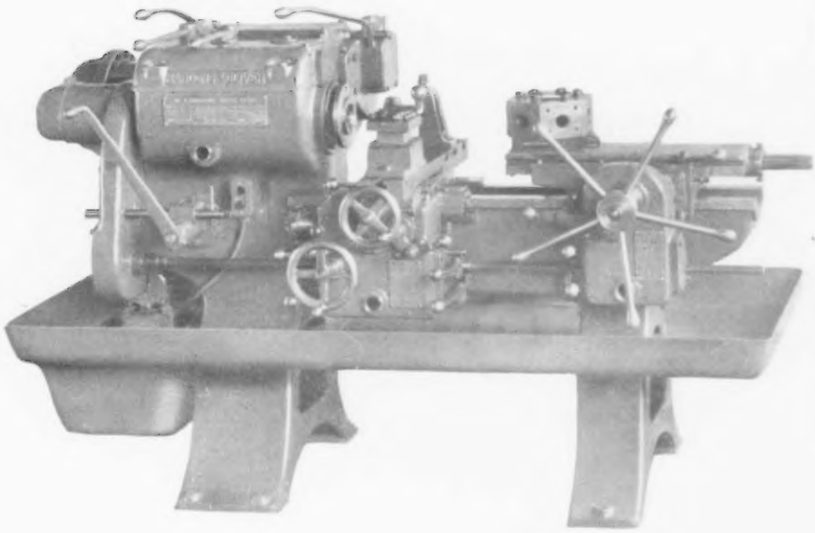


LATHES PRODUCED IN 1931

A NUMBER of features add to the productivity of this new No. 3 universal turret lathe, which has 1½ in. bar capacity and a swing of 15⅜ in. The six spindle speeds, from 67 to 740 r.p.m., are quickly obtainable by convenient levers and forward and reverse provided for all speeds. The hexagon turret is mounted on a Timken roller bearing. Other features include automatic indexing, an automatic turret binding mechanism, and a hardened bearing surface under the turret slide. The cross-slide has a very long dovetail bearing, protected from grit and chips, and all slide bearing surfaces are amply lubricated.

(Warner & Swasey Co.)



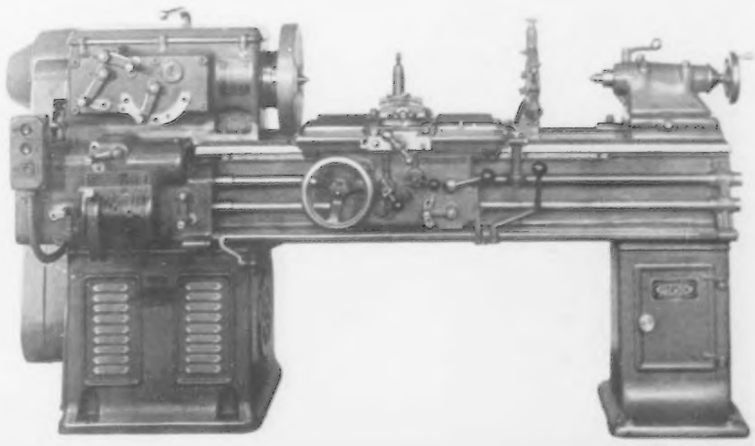


COMBINED force feed and cascade lubrication of the 12-speed all-geared head; automatic turret clamping ring and hardened steel ways on the bed, turret slide and saddle are outstanding improvements on this new No. 4 universal turret lathe. High spindle speeds, up to 1025 r.p.m., and ample strength and rigidity adapt the machine for tungsten-carbide tools. Other features include two double multiple-disk clutches that provide one quick speed change in addition to the usual forward and reverse. The swing over the bed is 18 in., and the capacity through the automatic chuck is 1 13/16 in.

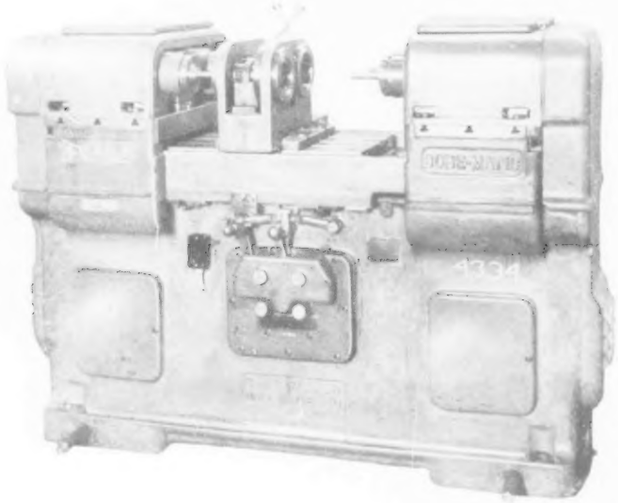
(Bardons & Oliver)

THE geared head of this 14-in. Tritrol 16-speed engine lathe is equipped with 30-deg. angle continuous herringbone gears, giving unusually quiet and smooth operation. The bed is heavy; it has three angular bearing V's and is rigidly reinforced by cross girts. The headstock is equipped with Timken roller bearings, and a Timken bearing main spindle can be furnished. Lubrication of the headstock is by a combination force-feed and splash system. All shafts in the apron are mounted on anti-friction bearings.

(Sidney Machine Tool Co.)

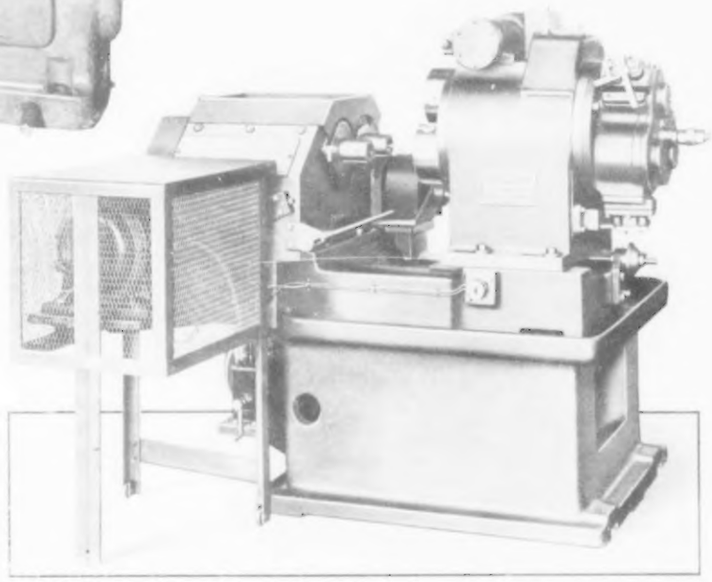


THE AUTOMATIC TREND

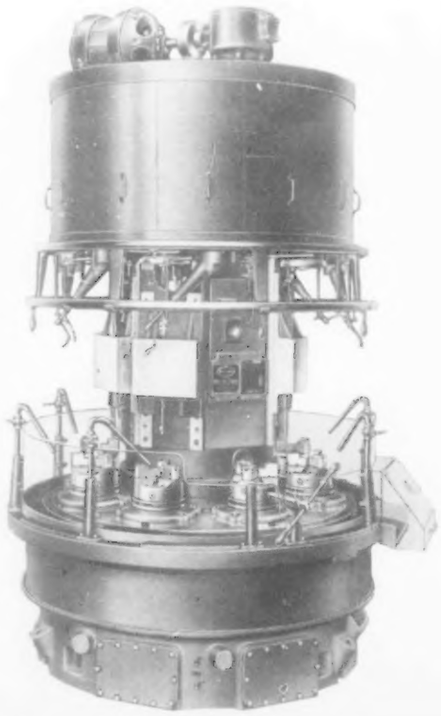


THIS machine, known as the "Borematic" was designed to secure maximum results when boring or turning with either diamond or tungsten carbide tools. Hydraulic operation is provided. The machine will rough or finish bore straight, taper, blind or interrupted holes and perform some turning operations where conditions permit. Holes from 5/16 in. to 6⅛ in. and 7 in. long are covered in the range of this double-end machine.

(Heald Machine Co.)



Cost Reduction Is Always a Good Investment



THIS two-spindle automatic chucking machine will perform in combination such operations as boring, facing, turning, drilling, reaming and threading, but is primarily intended for jobs requiring both plain machining and threading. Simplicity, wide range and quick set-up are general features. Spindle speeds range from 100 to 1500 r.p.m. The threading spindle is driven and reversed by an independent reversing motor unit that will handle small tapping jobs up to 25 a minute, yet has sufficient power to pull a 1¼ in. taper pipe tap in brass or iron.

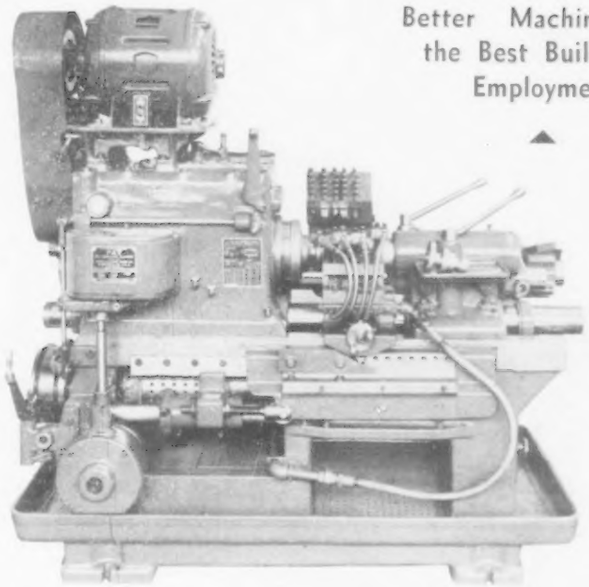
Goss & DeLeeuw Machine Co.)

DESIGNED to permit taking full advantage of the new cutting tool materials, even to anticipating future developments in such tools, this new Mult-Au-Matic, the type D, features massive construction with resultant absorption of vibration, full automatic lubrication, variety of multiple tool carrying heads and drill heads, greater power, increased speeds and feeds, and excessive use of anti-friction bearings. An eight-spindle, as well as a six-spindle model is now built, also six and eight-spindle Mult-Au-Matic center lathes.

(Bullard Co.)

CONTINUES

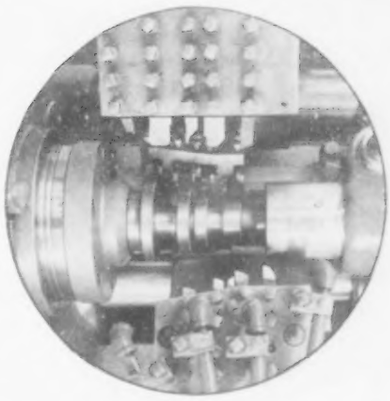
Better Machinery Is the Best Builder of Employment



UNIVERSAL camming, standard tool blocks, wide range of speed and feeds and multiple-tooling possibilities adapt this 12-in. Fay automatic lathe for a wide variety of work supported between centers or held in a chuck or fixture, the machine being suitable for small-lot manufacture, as well as for large-lot continuous production. Spindle speeds up to 1500 r.p.m. are obtainable.

The close-up view (at right) shows the tooling for finishing a 5-in. long, 4¾-in. maximum diameter cluster gear. With a spindle speed of 72 r.p.m. the floor to floor time is 1 min. 19 sec.

(*Jones & Lamson Machine Co.*)



THE new type C Mult-Au-Matic here shown is for the smaller classes of work up to 6¾ in. in diameter, 6 in. high. Like the new type D, it can be furnished in both six and eight spindle models and is massively built to permit effective use of the newer cutting tool materials. At the five or seven work stations may be mounted a variety of boring, drilling, reaming, facing and turning tools. The diameter of the six-spindle machine is only 55½ in.

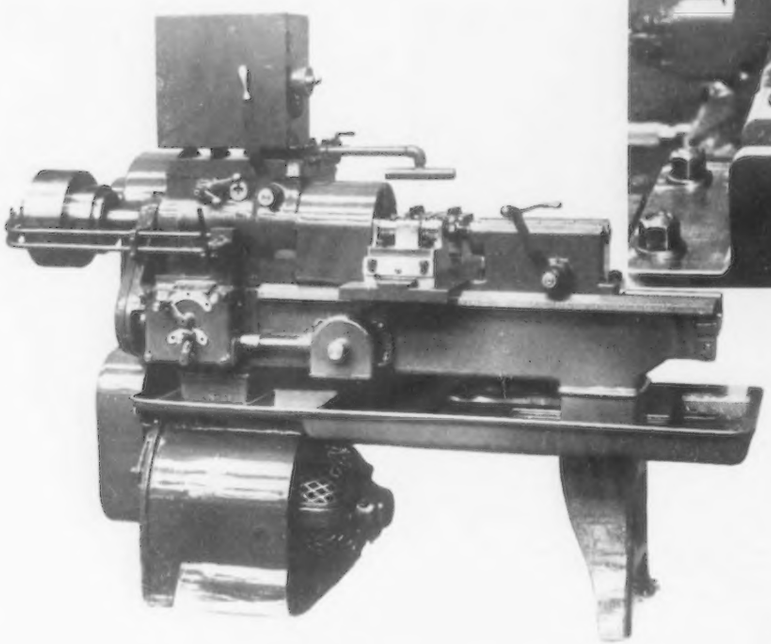
(*Bullard Co.*)

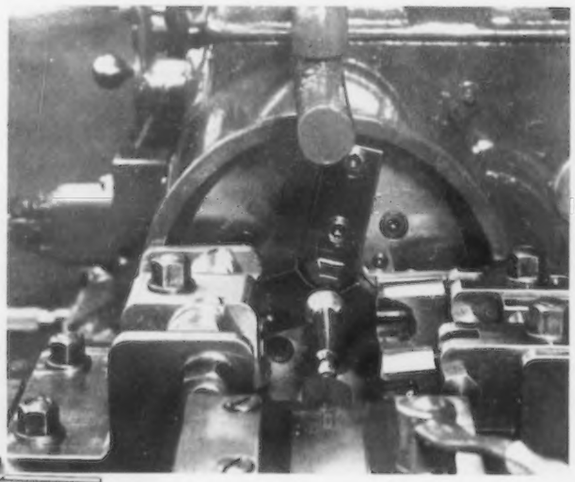
IN addition to all-hydraulic feeds, this automatic lathe features maximum rigidity obtained by casting the headstock, bed, base and chip pan in one piece. The spindle is mounted in anti-friction bearings and runs clockwise, opposite to the usual lathe. High spindle speeds, up to 1000 r.p.m., as well as rigid construction and smooth operation, adapt the machine for the new hard alloy cutting tools. In rough turning, facing and grooving cast-iron pistons, production is at the rate of 60 to 90 pieces an hour.

(*John S. Barnes Corpn.*)

THE AUTOMATIC TREND CONTINUES

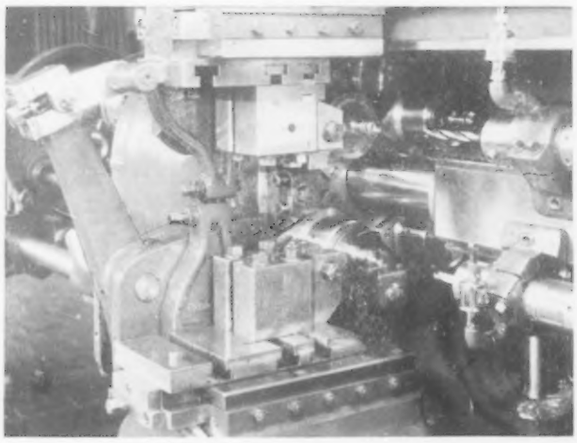
Make Less Dollars Earn
More Profits Tomorrow





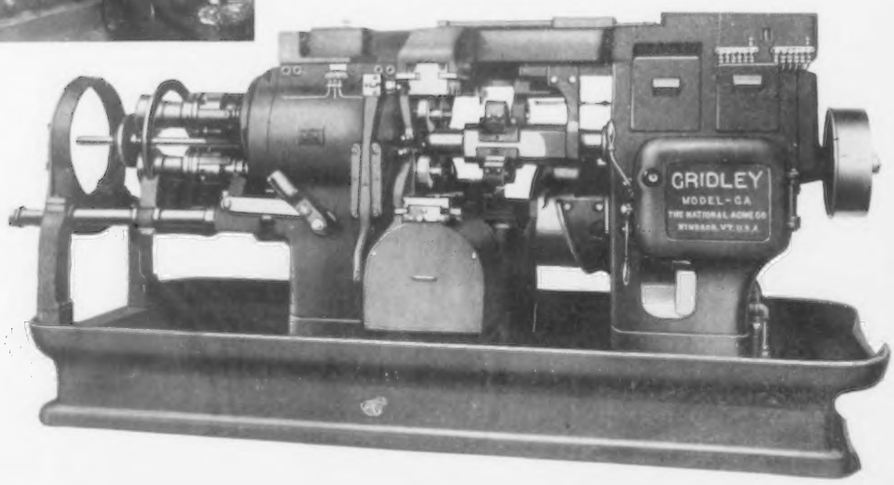
TOOLED for rough and finish forming of ball joints on the lower end of an automobile transmission shifter lever, this special automatic facing and forming lathe produces at the rate of 50 pieces an hour. Simplicity is the keynote of its design. Spindle speeds up to 1000 r.p.m. are obtainable through the six-speed roller bearing geared head. The feed mechanism provides a wide selection through manipulation of two change levers.

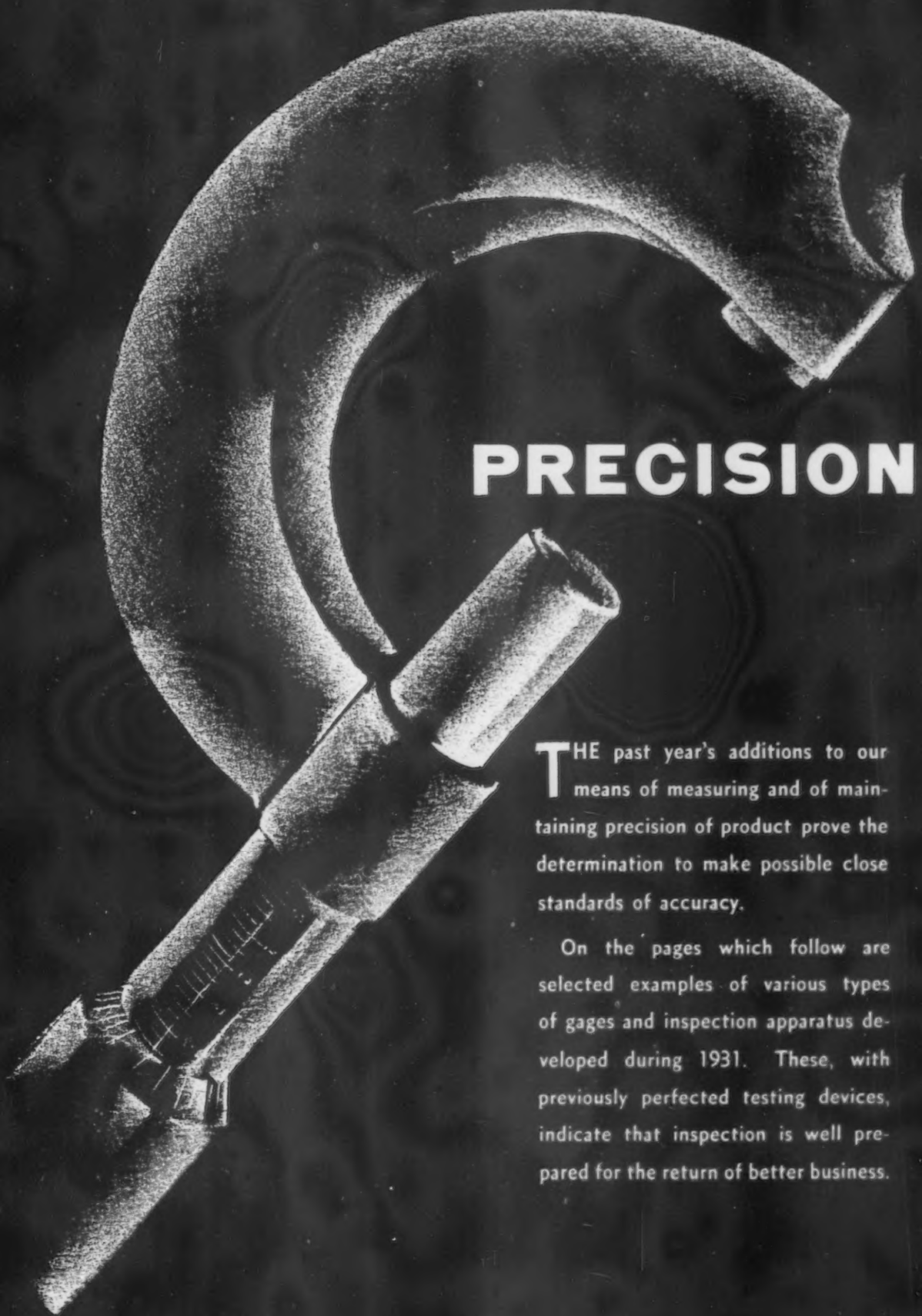
(R. K. LeBlond Machine Tool Co.)



OPEN-FRAME, heavy construction, assuring extreme rigidity and large chip space are provided on this Gridley four-spindle GA automatic screw machine. The cross slides are heavy and each of them is individually cammed to permit proper feed for each slide. A stop-stock of "disappearing type," which operates vertically, gives sufficient clearance in the fourth position to permit use of standard tooling. The open construction simplifies tooling and makes for accessibility, as shown in the close-up of the cross slides in first and second position, and ease of set-up adapts the machine for short run work. Close accuracy is obtainable, with appreciable increase in output as compared with the company's previous models.

(National Acme Co.)





PRECISION

THE past year's additions to our means of measuring and of maintaining precision of product prove the determination to make possible close standards of accuracy.

On the pages which follow are selected examples of various types of gages and inspection apparatus developed during 1931. These, with previously perfected testing devices, indicate that inspection is well prepared for the return of better business.

TO MEASURE PRODU

VARIATIONS in measurements as small as 0.00001 in. are magnified 10,000 times by the electric gage shown in the accompanying picture. It is particularly suitable for rapid inspection of automobile and other small parts produced in quantity. Electrical magnification is obtained by unbalancing a bridge circuit of four inductances.

(General Electric Co.)

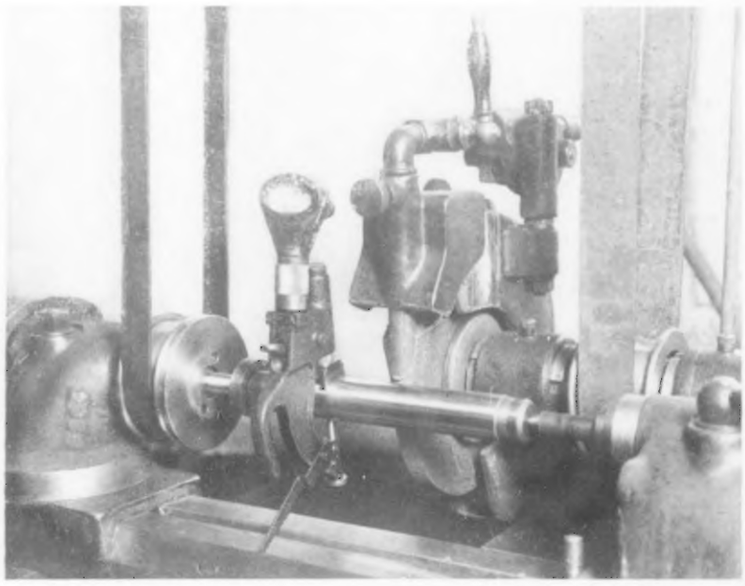
▲ ▲ ▲

NO highly developed sense of "feel" is required of the operator of this Electrolimit gage for rapid and accurate inspection. Manufacturing limits of a few tenths of thousandths can be amplified to several inches on the dial of the electrical indicator.

(Pratt & Whitney Co.)

THE Zeiss Optotest, here shown in use, employs an optical pointer system which gives a magnification of 1000 to 1. The index line is projected on a translucent scale.

(George Scherr Co.)

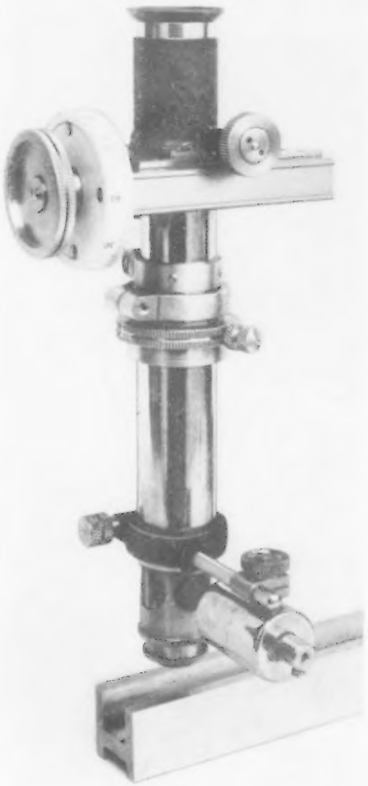


CONTINUOUS gaging of cylindrical work on a grinding machine is shown in the accompanying action picture of a special device fitted with a Krupp Mikrotast indicator. Widia-faced contacts eliminate appreciable wear and an adjustable arm resting against the grinder bed keeps the instrument from rotating with the work.

(Coats Machine Tool Co.)

▲ ▲ ▲

TOMORROW'S CTION



THIS micrometer microscope, shown focused on a precision standard of length, is especially adapted for checking profiles of small gears or screw threads, or for measurement of fine wires, etc. Divisions on the micrometer drum permit estimates to 0.000005 in.

(R. Y. Ferner Co.)

▲▲▲

LAMPS flashing green, amber and red eliminate the personal equation by showing without question whether the part checked is undersize, satisfactory or oversize. Set to standard blocks, this gage has a diamond-tipped plunger and an anvil surfaced with tungsten-carbide.

(Sheffield Machine & Tool Co.)

▲▲▲

To Compete Tomorrow, Prepare for Cost Reduction Today

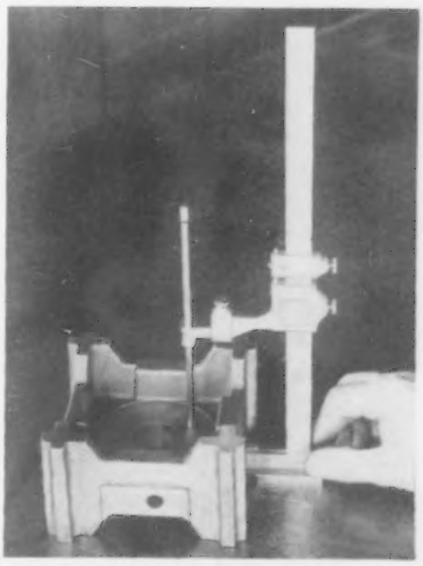
▲

MEASURING bores and other internal dimensions is facilitated by telescoping gages used as shown at left. The plunger of the head will expand to the exact size of the hole; it is then locked and measured with a micrometer caliper.

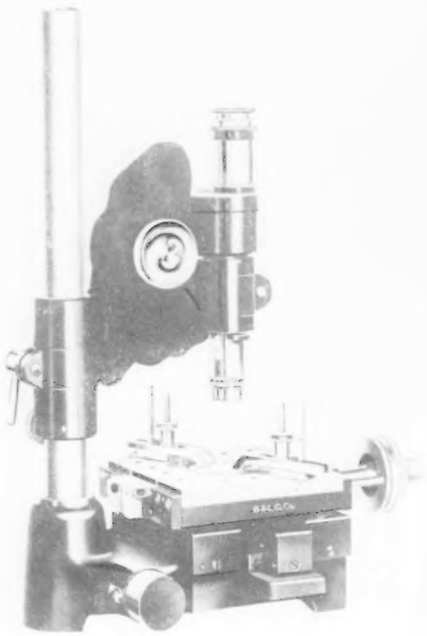
(Brown & Sharpe Mfg. Co.)

THE small attachment shown on this vernier height gage converts it into an accurate and convenient depth gage. Measurements can be taken over high projections and in deep recesses.

(Brown & Sharpe Mfg. Co.)

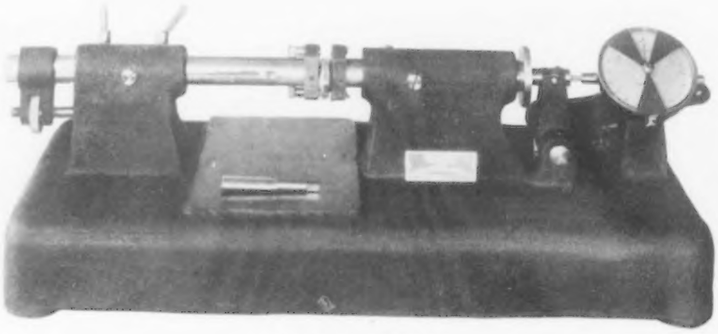


TO MEASURE TOMORROW'S PRODUCTION



ACCURACIES as close as 0.0001 in. may be quickly and precisely determined with this tool-maker's microscope. The positive focusing mechanism is protected by a flexible leather case, as shown.

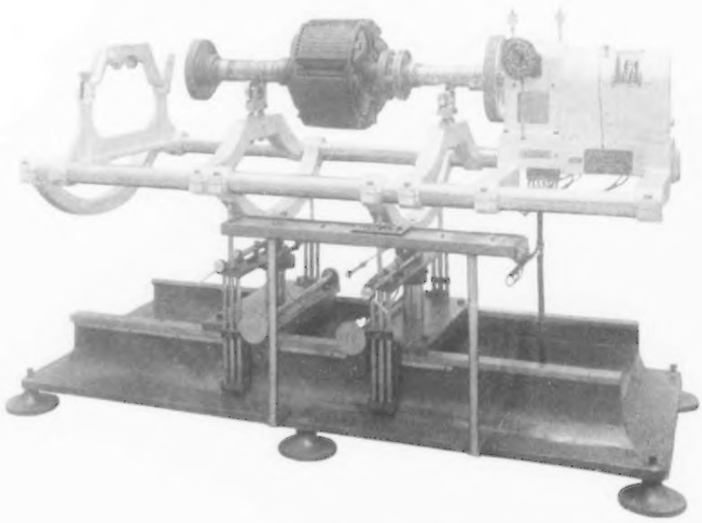
(Bausch & Lomb Optical Co.)

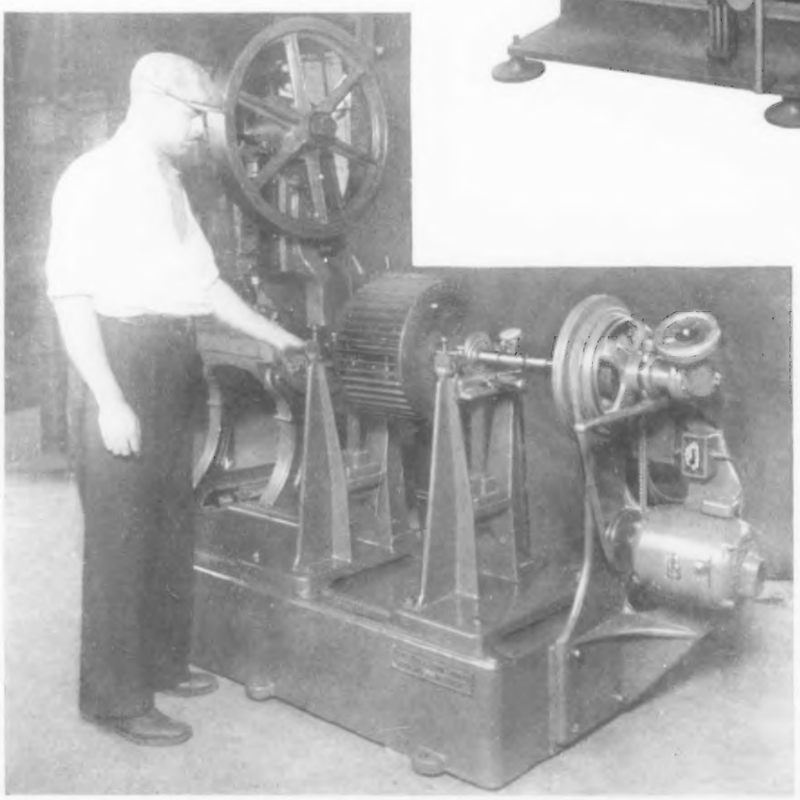


ADJUSTABLE shutters on the dial of this thread-checking gage can be set to indicate allowable tolerances, thus facilitating rapid inspection by the three-wire method. The indicator dial is graduated to 0.0001 in.; spring pressure on the anvils is adjustable.

(Federal Products Corpn.)

▲ ▲ ▲





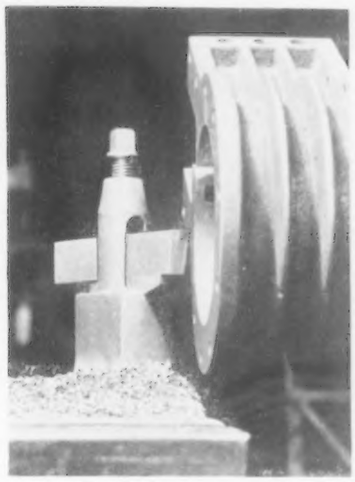
ROTORS weighing from 125 to 1000 lb. can be tested rapidly for dynamic balance on the machine shown above. When balance is obtained an electric dial, which indicates direction of unbalance, stops sparking. Amount of unbalance is shown by an adjustable weight.

(Tinius Olsen Testing Machine Co.)

A NEON light locates the spot of unbalance in rotors tested on the dynamic balancer at left. This unit is especially arranged for large ventilator fans.

(Globe Tool & Engineering Co.)

SMALL TOOLS SHOW STAMINA AND ADAPTABILITY



"RAMET" cutting metal, consisting of tantalum carbide held in nickel, forms the inserts of these new cutting tools, the tips of which are brazed to steel shanks. A molybdenum cushion minimizes the liability of breakage.

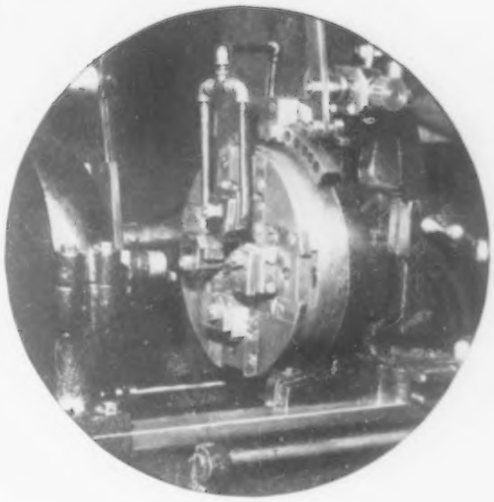
(Ramet Corpn. of America)

Look to Better Equipment for Bigger Profits

▲

ONE upward movement of a lever lifts all dies clear of threads and couplings in the "Bikeko" die head at the right. It is also adapted for quick changes of pipe size, the removal of but one screw being necessary.

(Bignall & Keeler Machine Works)



PRECISION boring is facilitated by these new "Fanger" single point boring tools, at left. Their circular cutter form enables regrinding as long as there is any form left on the circumference.

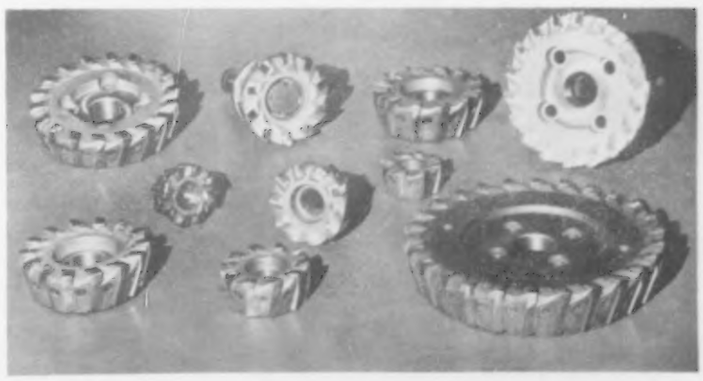
(Bochum Tool Co.)

NO auxiliary locking devices are required to lock the blades of these "O.K." face mills with tungsten carbide inserts. Face mills of 10 standard sizes, from 4 to 14 in. diameter, are supplied, and end mills from 1½ to 6 in. diameter.

(O. K. Tool Co.)

THE new "Widia" cemented carbide provides the means for machining steel at higher speeds than with high speed steel. Cratering action has been practically eliminated.

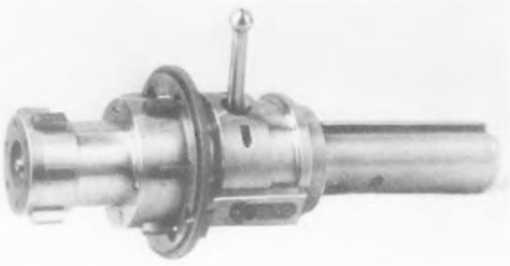
▲▲▲ *(Thomas Prosser & Son)*



DESIGNED to develop the full capabilities of its new milling machines which were constructed to utilize the advantages of the new cutting tools, this company has produced a line of tungsten carbide cutters from 3 to 18 in. diameter.

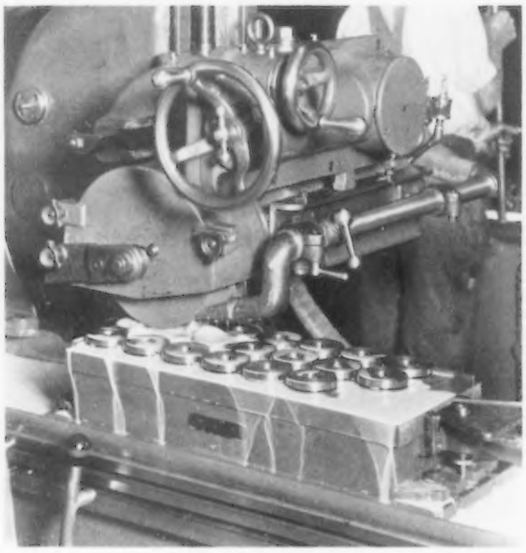
(Kearney & Trecker Corpn.)

SMALL TOOLS SHOW



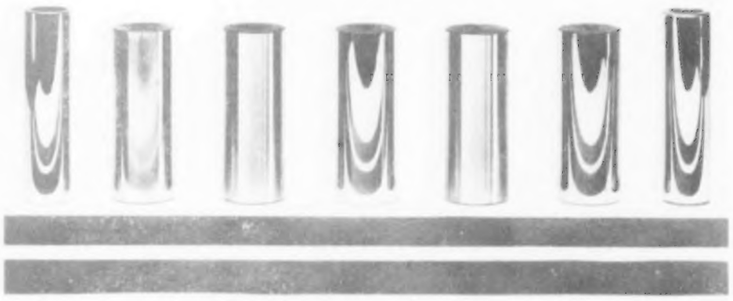
THESE combination taps, which cut threads on two diameters simultaneously, are new designs. The principle is applied both to the solid and the collapsible types, cutters however being adjustable in both cases. The pitch of the two diameters cut, must of course, be the same.

(*Geometric Tool Co.*)



SET up time is reduced to a minimum by this magnetic chuck, which is shown grinding thrust washers to close accuracy limits. Although the parts are flooded with coolant, the chuck cannot leak or short-circuit.

(*Taft-Pierce Mfg. Co.*)

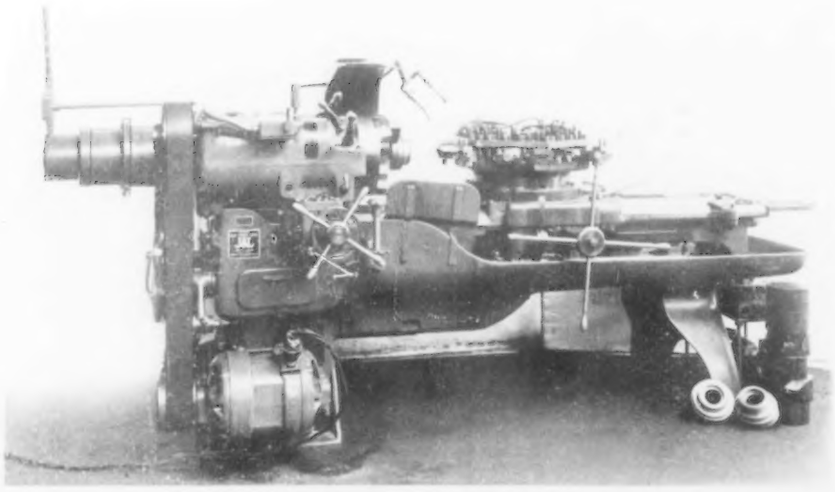


SOLID grinding wheels, capable of producing finishes closely approaching those obtained by lapping, are now obtainable in Alox-ite-Carborundum combinations. Applications of these new wheels include the finishing of piston pins and bearings, raceways, and rolls.

(*Carborundum Co.*)

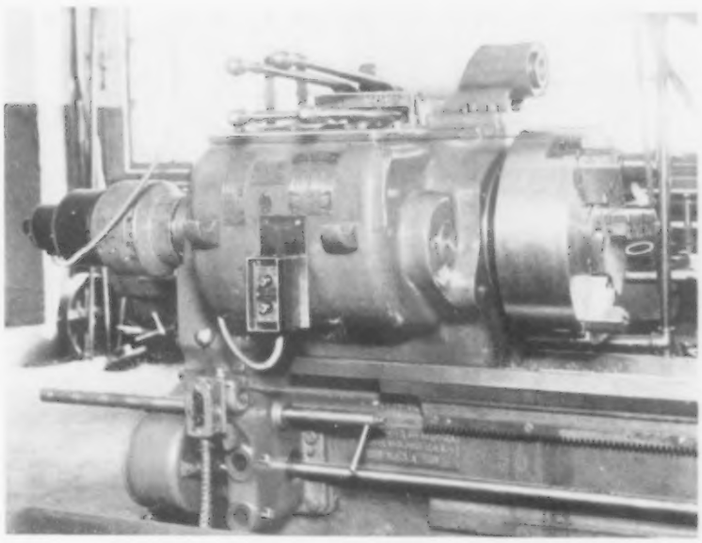
THE throw of a switch operates the "Cushmatic," electric chuck shown on machine at right. Great gripping power is provided, with almost negligible electric power consumption. A second type of unit is available for multiple spindle machines.

(*Cushman Chuck Co.*)



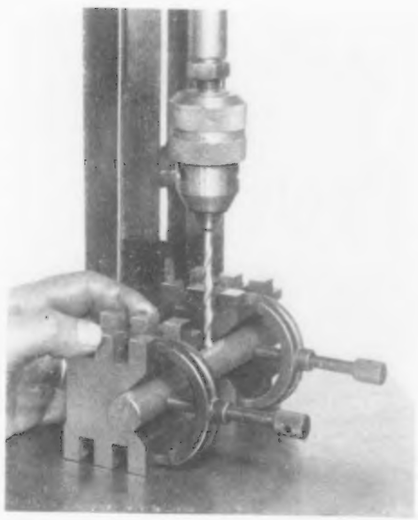
STAMINA AND ADAPTABILITY

Better Equipment Must Offset Reduced Buying Power



CHUCKING time is turned into cutting time through this electric chuck, which also enables one operator to take on additional machines with consequent increase in output. Push button control is provided.

(Union Mfg. Co.)



STEPPED construction enables quick size changes on these V blocks and clamps, which are ground in pairs to assure alinement.

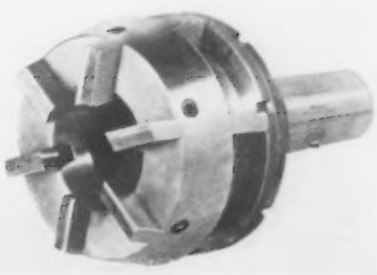
(Brown & Sharpe Mfg. Co.)

NO hammering is necessary to obtain a positive grip on a broken screw stud or similar screwed part when using the screw extractor shown here. An interrupted left-hand thread feeds the tool into a hole drilled in the broken screw or stud which can then be removed without danger of jamming the threads.

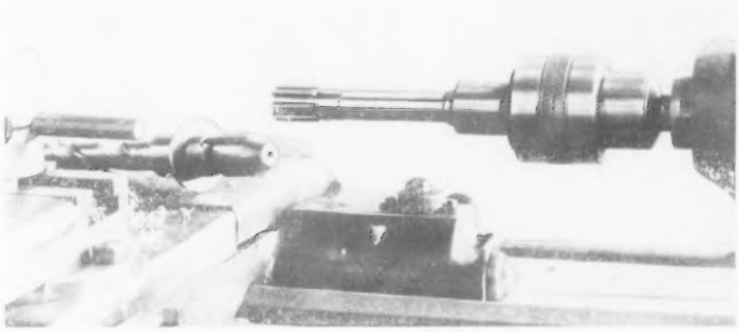
(Greenfield Tap & Die Corpn.)

SPECIAL tools using the serrated blades standardized for its expansion reamers have been developed by this company for varied applications. A roughing and finishing tool for machining five surfaces at once is shown above, a hollow mill and spot facer at right.

(Goddard & Goddard Co., Inc.)



SMALL TOOLS SHOW STAMINA AND ADAPTABILITY



THIS "Sol Ex" reamer is so designed that the blades can be expanded radially and ground at least fifteen times. Between these radial grinds, the leads can be repeatedly ground without blade adjustment as with a solid reamer.

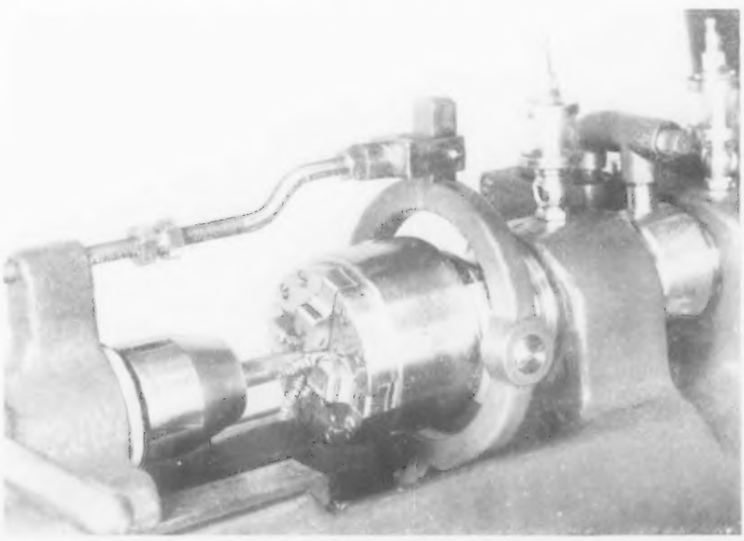
(McCrosky Tool Corpn.)

THE steep spiral angle promotes smooth cutting and eliminates chatter in the new "Helex" taper pin reamers shown above.

(National Twist Drill & Tool Co.)

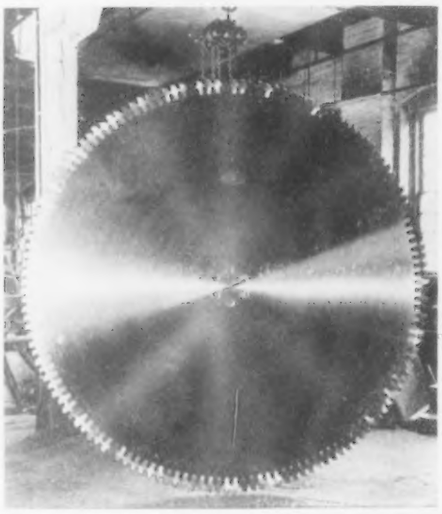
THE self-opening die head below has small renewable inserts of high speed steel which are quickly replaceable. It is claimed that chaser costs usually have been halved and their life extended to between two and one-half to three times.

(Eastern Machine Screw Corpn.)



THE spiral edges of this extractor grip the screw and enable its withdrawal without damaging the threads of the hole. Twelve sizes are provided, covering the entire range of shop and oil well work.

(Morse Twist Drill & Machine Co.)



MADE of "silver steel" 108 in. in diameter and ¼ in. thick, the circular saw shown here will be used in the manufacture of wood products. It has 144 teeth held in the blade by milled groove and rivet. Operation is at 470 r.p.m.; a similar saw of 72-in. size is used to cut hot steel billets.

(E. C. Atkins & Co.)

THIS white grinding wheel for tool and cutter grinding and surfacing high speed or hardened steel is a new product which is said to cut faster and cooler than many other wheels.

(Abrasive Co.)

PRESS WORK

SHEET metal parts, produced by stamping, drawing or forming, constitute an increasing proportion of the components of general machine and product design. Developments in the metals used for these purposes as well as improvements in presses and allied sheet metal-working equipment account for this steady gain.

The equipment depicted on the following pages has been selected as characteristic of technological development in this division of the metal-working field during 1931.

MODERNIZING IN GOES

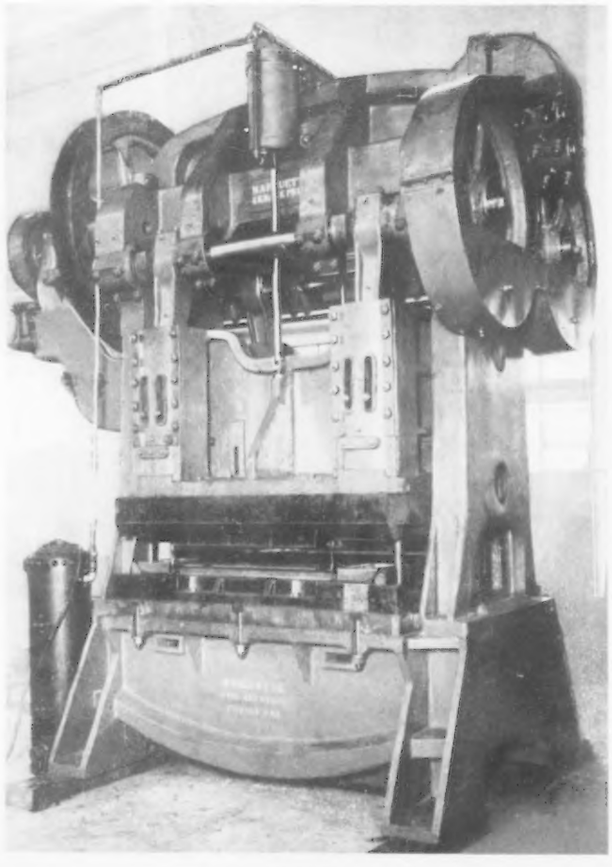
THE past year has not been an exciting one for the stamping trade in point of volume of business, although in that respect the last quarter seemed distinctly better in tone. In certain respects the lull has served a very useful purpose, for in many plants existing methods and equipments have been subjected to a more careful examination than is possible under the pressure of normal operation. The result has been a modernization of methods and the installation of, or planning for, more modern equipment in a great many instances.

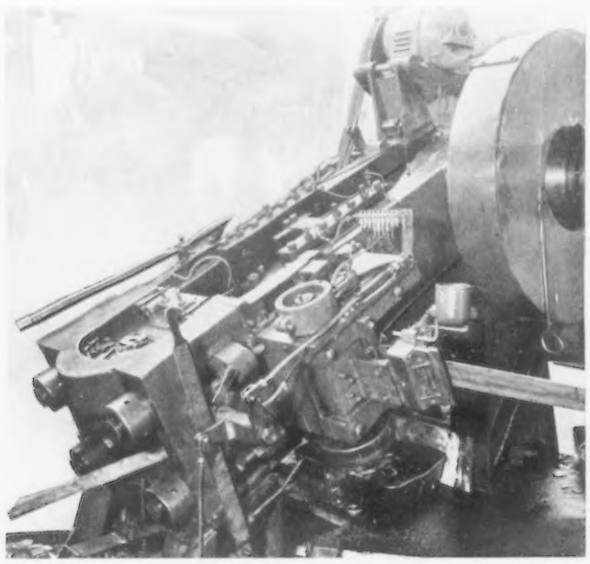
Improvements have been, and must continue to be, made in metals and metal-working methods. The plastic working of metals, which is the business of the stamping trade, seems at last to be changing into a science. The value of such a change will become apparent in less rejection of metal, less scrap in production and less experimenting in tool development. The year has seen a new interest evidenced by some of the engineering societies in the problems involved and an effort on the part of the trade and the mills to aid in proving certain theories and rules which have been offered.

In the mills, rolling speeds have increased in the roughing stands to as high as 500 ft. a minute, due in part to roller bearings, new electrical controls, new geared drives, etc. Reductions per stand have also been greatly increased by the use of backed-up rolls in cluster and four-high mills. The mill metallurgists are taking even greater care than ever in trying to obtain uniformity with a maximum of ductility. Annealing methods, of course, play a large part in this.

The increase in mill capacities for the production of coil stock is in line with the increasing demand for metal in that form. And this in turn is owing to the more and more extensive use of automatic feeds on presses and especially of the new type of high-speed "high production" presses. One of these machines producing telephone pole washers from hot rolled coil steel 5/32 in. (0.156 in.) thick is operating satisfactorily without a straightener on this heavy gage.

It is the natural tendency of the mills to coil stock on the smallest possible core, but that is not in the best interests of the consumer. Several types of straighteners built on the press are available, but these are





THE inclined position (above) is here utilized to produce flat rings 3/8 in. thick. The press replaced two machines with a crew of three men and at the same time trebled production.

FOUR-POINT suspension, or four-crank, presses are a radical departure and may "supersede double-crank presses."

STAMPING TRADE APACE

By E. V. CRANE
Staff Engineer,
E. W. Bliss Co.,
Brooklyn, N. Y.

an added complication and cannot be used with many classes of tools.

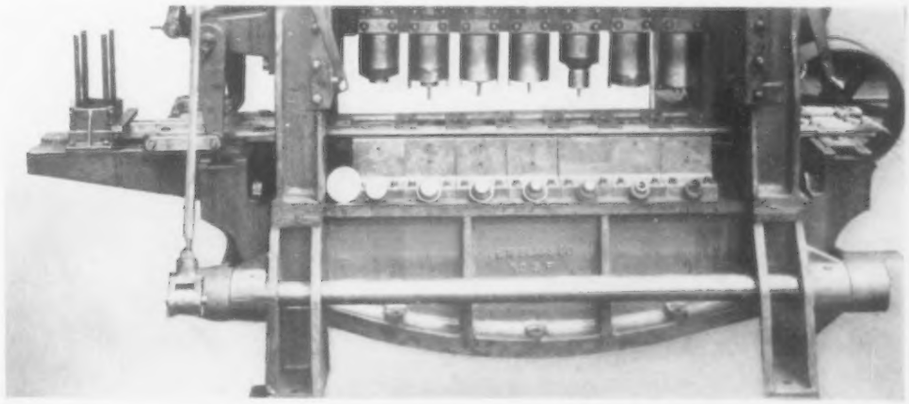
The most satisfactory practice is to order the metal recoiled on a sufficiently large diameter so that it is bent little if any beyond its elastic limit in coiling and will come off flat or practically so. A slight curvature will often straigthen out of its own weight or be straightened out in the die operation. The diameter of the coil is then a function of the gage of the metal and its temper. The larger coils are being handled in open stands with rollers having Timken bearings.

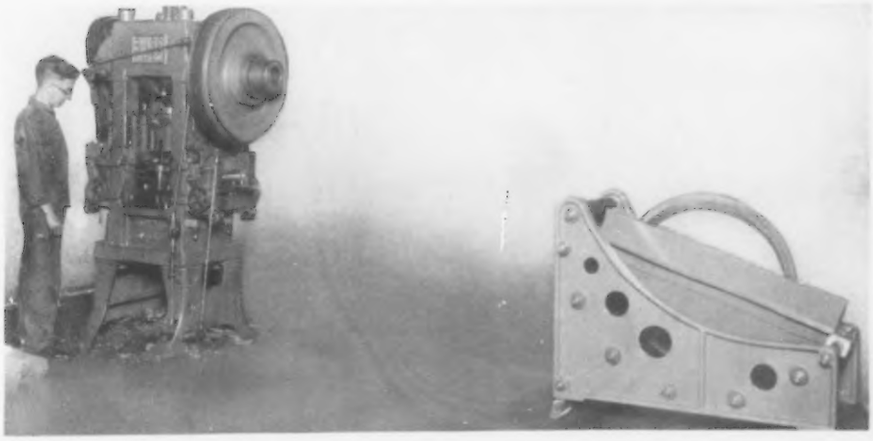
It is an interesting fact that while the demand for presses generally has been at a naturally low ebb during the last two years or so, the demand for the new automatic types of equipment has shown a steady rise. The fact is illustrated in the use of the inclined position in more and more of the automatic units. In such an application, a Mid-western company is producing heavy rings which must be flat. Accordingly, compound dies are used and the part is discharged from the punch toward top stroke. The metal is ⅜ in. thick hot-rolled steel in strips, and the parts are produced at the rate of 60 pieces (strokes) a minute. This is not fast compared with 200 to 400 strokes a minute on many recent "high production" equipments. It is very fast, however, when we consider the cutting edge impact on metal of such thickness (0.375 in.). This press with a single operator replaced two machines with a crew of three men and at the same time trebled the production rate. The man hour efficiency is then increased 800 per cent, and this is indicative of the reasons for installing most of the new automatic equipments.

Really the outstanding trend of the year is that toward the elimination of separate handling of parts, the combination of groups of operations on a given part in a single die or press. This is being done in the "high production" roll feed presses with long follow dies in which the part is kept attached to the scrap through the series of operations and sheared out in the last step. The same economy of handling and storage is achieved, often with greater economy of material, in multiple slide presses

(*Continued on page* 124)

TRANSFER feed units to save handling are becoming increasingly popular in multiple slide presses.

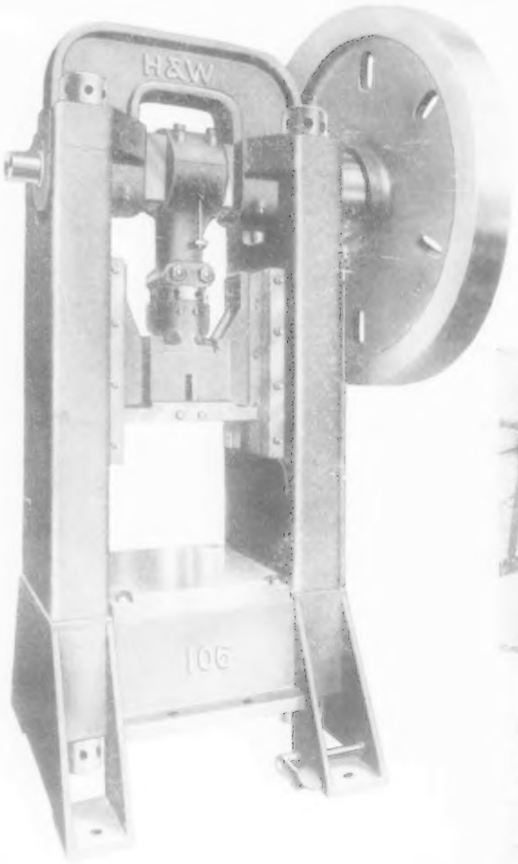


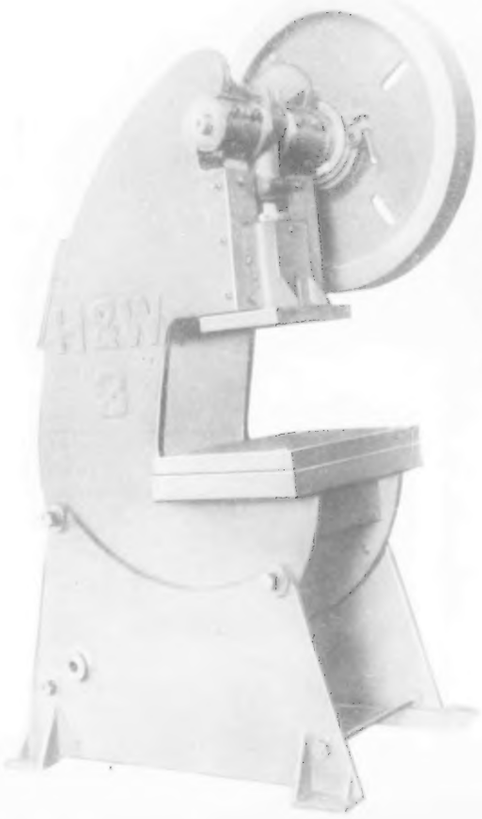


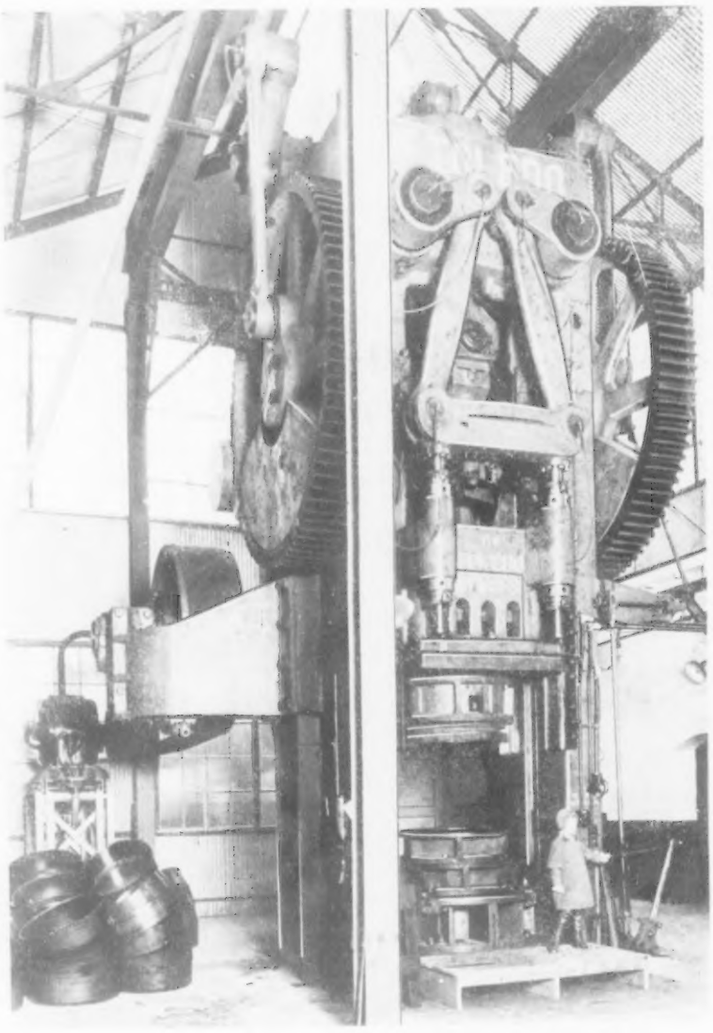
THIS modern "high production" press is producing washers from coil steel 5/32 in. thick. The metal, recoiled to a relatively large diameter, is handled in the open stand shown with the rollers equipped with Timken bearings.

PRESS DESIGN

Industry Needs What Improved Machinery Has to Offer







FORTY quart milk cans are drawn in this 1200-ton drawing press, the material used being Allegheny metal. The machine weighs 220 tons and is 35 ft. in height. The stroke is 45 in.

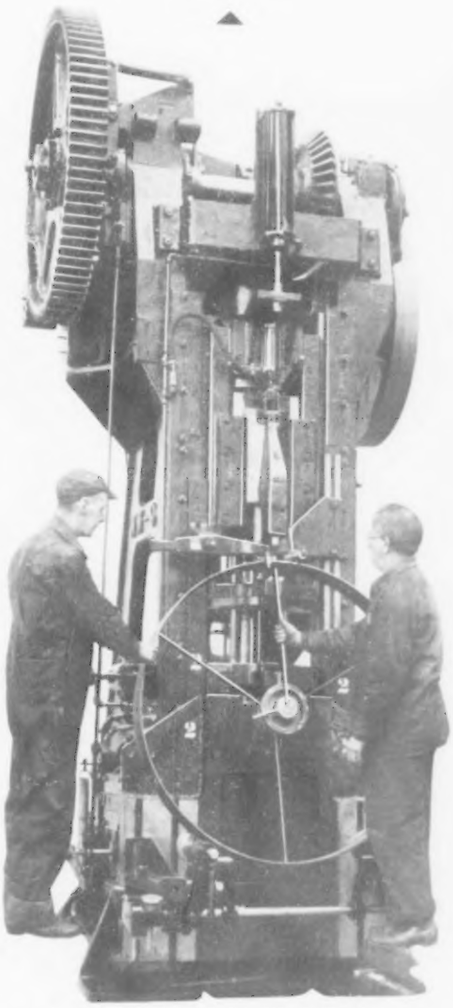
(Toledo Machine & Tool Co.)

EXPONENTS of a new line of welded steel presses are shown in the accompanying pictures (at left). The series includes double-crank straight sided presses, horning types, straight sided knuckle joint presses, double crank overhanging cap frame presses as well as special types. A straight sided press and an inclinable press are shown.

(Henry & Wright Mfg. Co.)

CONTINUES ITS PROGRESS

Economic Battles Are Fought and Won with Machinery

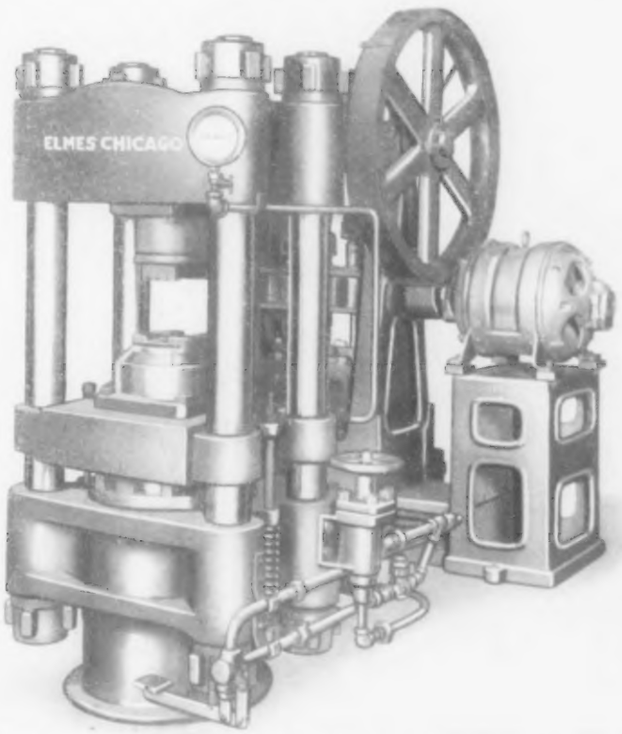


THIS automatic wheel spoking machine used for riveting spokes to hubs and rims of implement wheels. Both ends of the spoke are riveted automatically and simultaneously. Wheels from 28 in. to 54 in. diam. are handled, with minimum spoke length of 11 in. and maximum diameter of ¾ in.

(Williams, White & Co.)

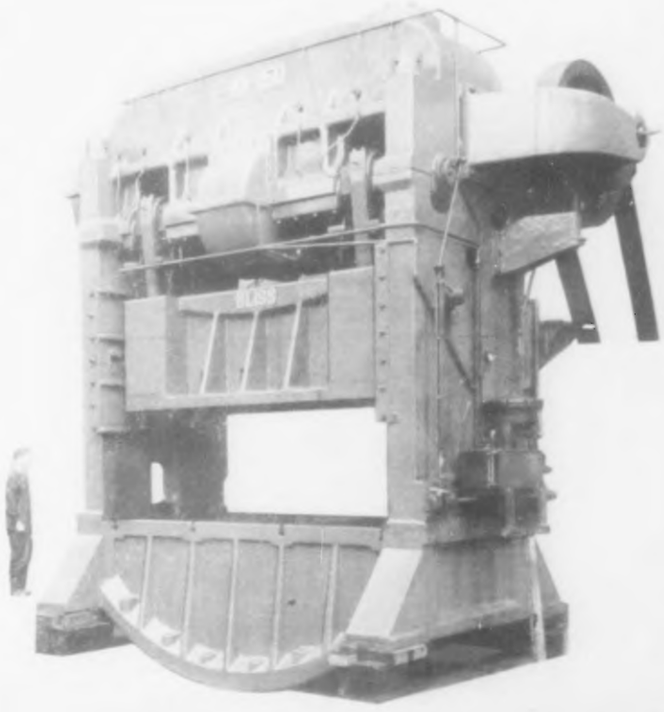
PARTICULARLY well adapted for unsymmetrical dies is this four crank press which is designed to handle off center loads. The bed area is 150 in. by 70 in. and the weight is 250,000 lb. The stroke is 10 in. The crankshafts revolve in opposite directions, thus cancelling rod angularity effects.

(E. W. Bliss Co.)

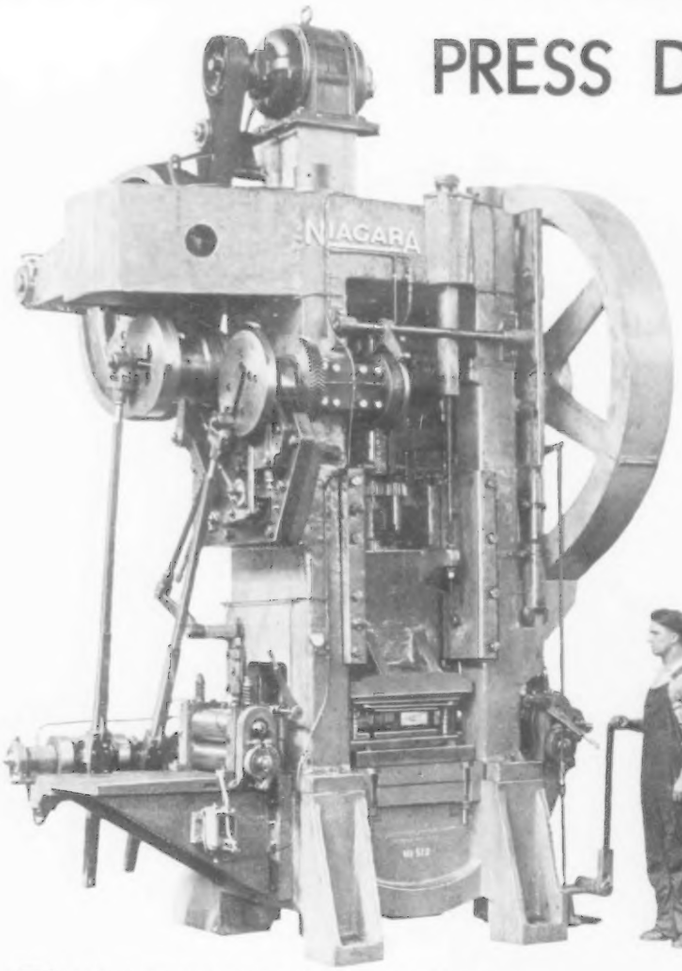


FROM 450 to 600 impressions per hour can be produced on this 300-ton capacity automatic, hydraulic stamping and marking press. High and low pressure vertical pumps provide a maximum pressure of 4000 lb. per sq. in. Bypass valves automatically reset after each cycle is completed.

(Charles F. Elmes Engineering Works)



PRESS DESIGN CONTIN

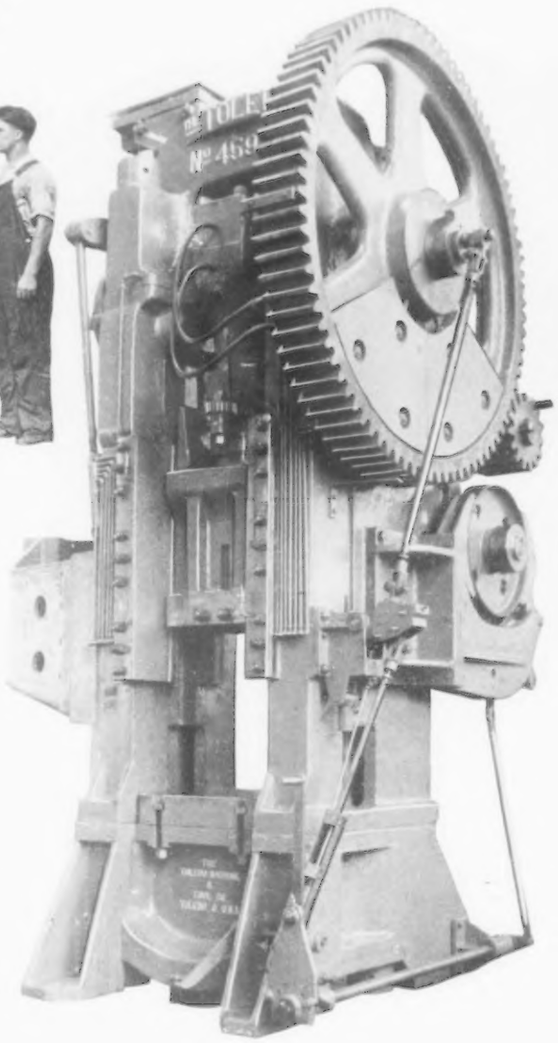


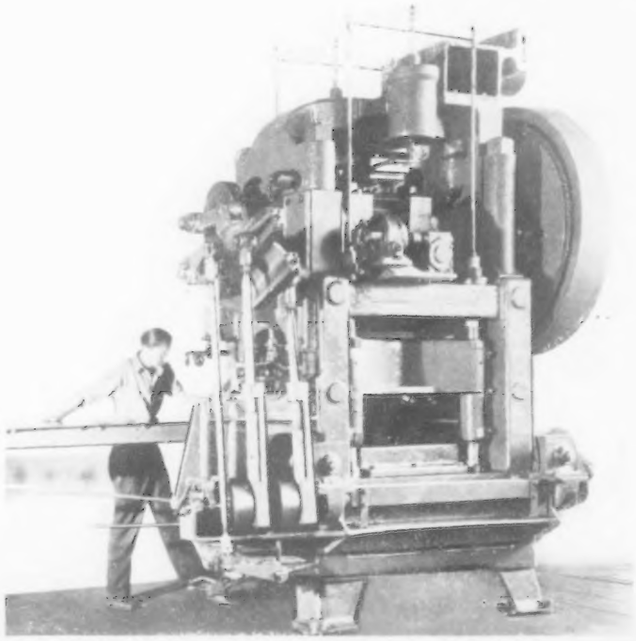
A TWO increment roll feed (at left) is one of the features of this press of new design. By means of this feed, uniform spacing of hole groups is automatically obtained, with an automatic variation at the end of the sheet providing an unpunched margin. The press stops automatically after each sheet is discharged.

(Niagara Machine & Tool Works) ▲▲▲

THIS (below) is said to be an entirely new design of power press. It employs the principle of sub-press post guide construction, except that the posts are clamped in the gate and slide with it. The post guiding principle practically eliminates tool shear.

(Waterbury-Farrel Foundry & Machine Co.) ▲▲▲

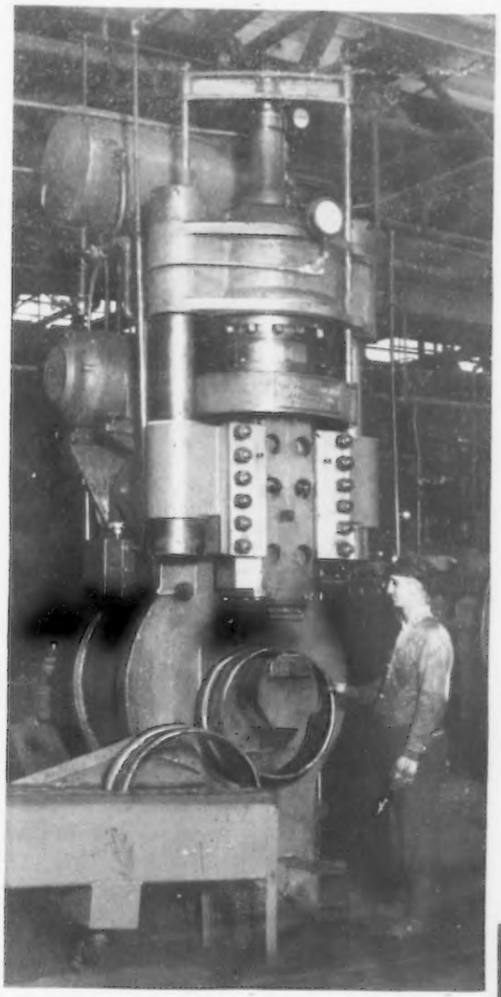




OF 85,000 lb. capacity, this press is especially designed for extruding, forming and forging such parts as valve heads, globe valve covers, etc. Coining operations are also well handled.

▲▲▲ *(Toledo Machine & Tool Co.)*

UES ITS PROGRESS



THIS "Hydromatic" horning press is one of four recently installed in the plant of the Firestone Steel Products Co. It has a 300 ton pressure capacity and can be operated continuously on a cycle speed of 35 strokes per min.

(French Oil Mill Machinery Co.)

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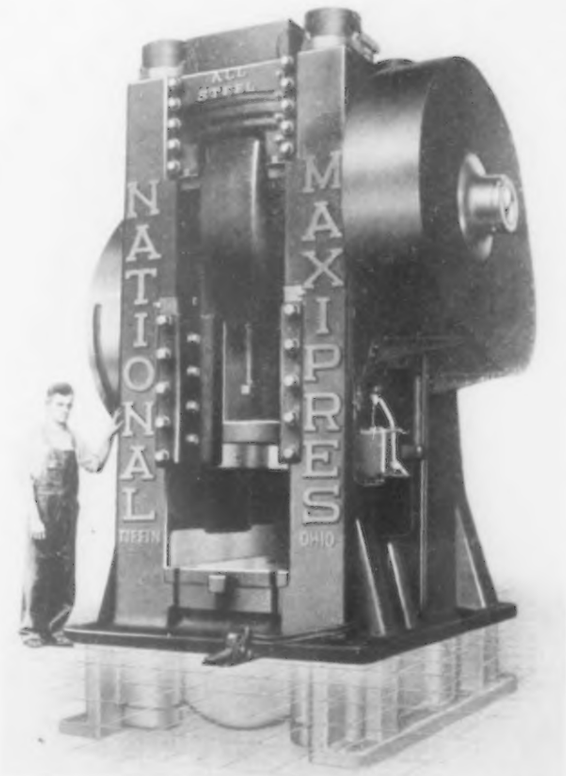
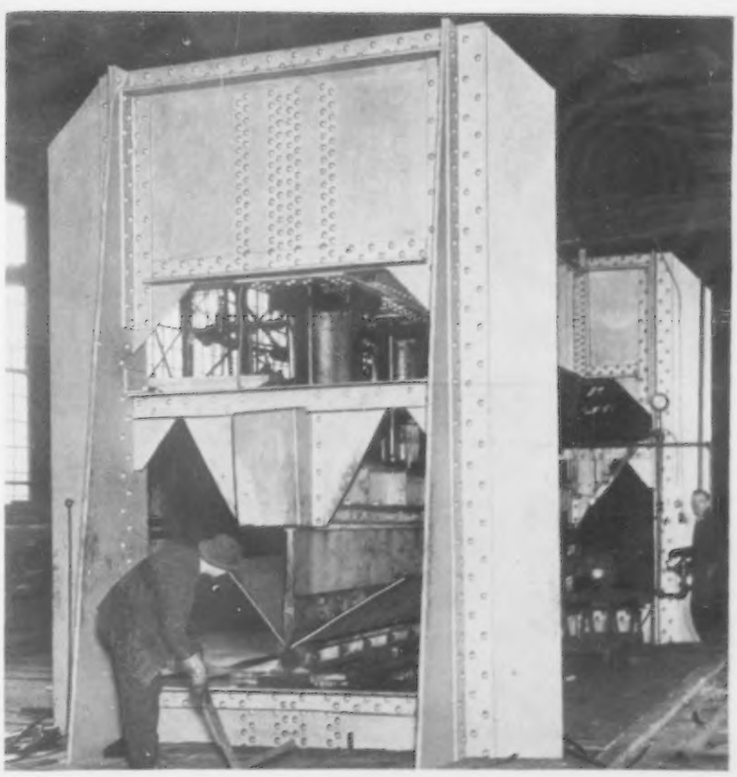
THIS brake for heavy plate bending and forming is hydraulically operated and is made in 250, 500 and 1000 ton capacities. The steel frame permits of either welded or riveted construction and the design enables easy adaptation to special needs.

(Watson-Stillman Co.)

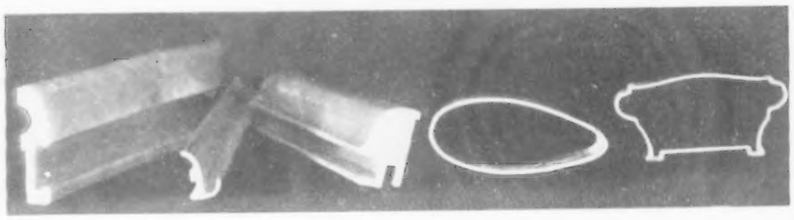


THE entire frame of this "Maxipress" is a one-piece steel casting. The machine is used for the rapid coining, swaging or forming of parts, hot, semi-hot or cold. It is made in eight sizes, varying in weight from 19,000 to 368,000 lb. Only three bearings are employed between the source of power and its application.

(National Machinery Co.)

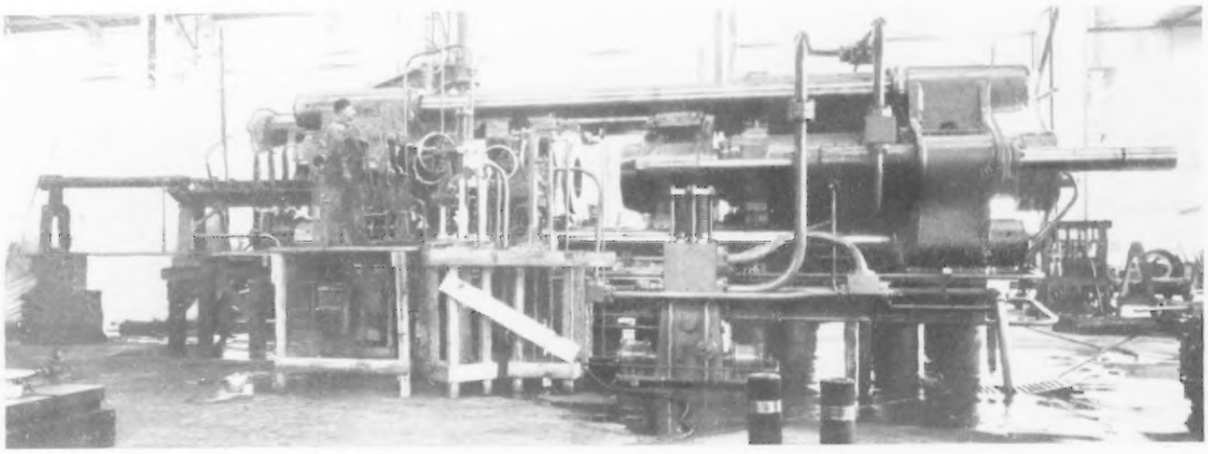


PRESS DESIGN CONTINUES ITS PROGRESS



Improved Machinery Will Rejuvenate Tired Dollars

▲



A 4200 ton extrusion and piercing press, together with some samples of its work, are shown in these pictures. Rods, shapes and tubes are extruded either by the direct or indirect method and solid billets can be pierced while in the container. Commercially concentric tubes can be extruded. Auxiliary rams are provided for cutting off, loading and supporting billets.

(Baldwin-Southwark Corpn.)

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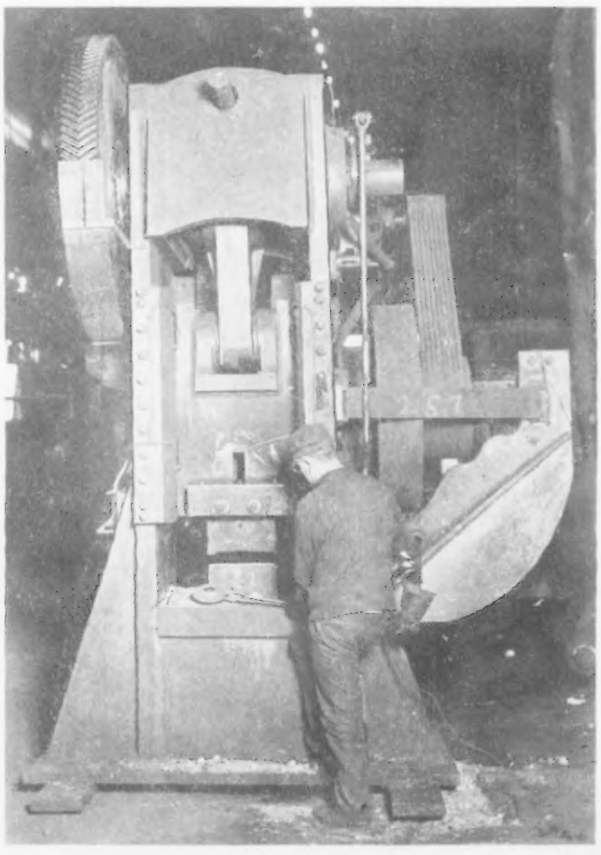
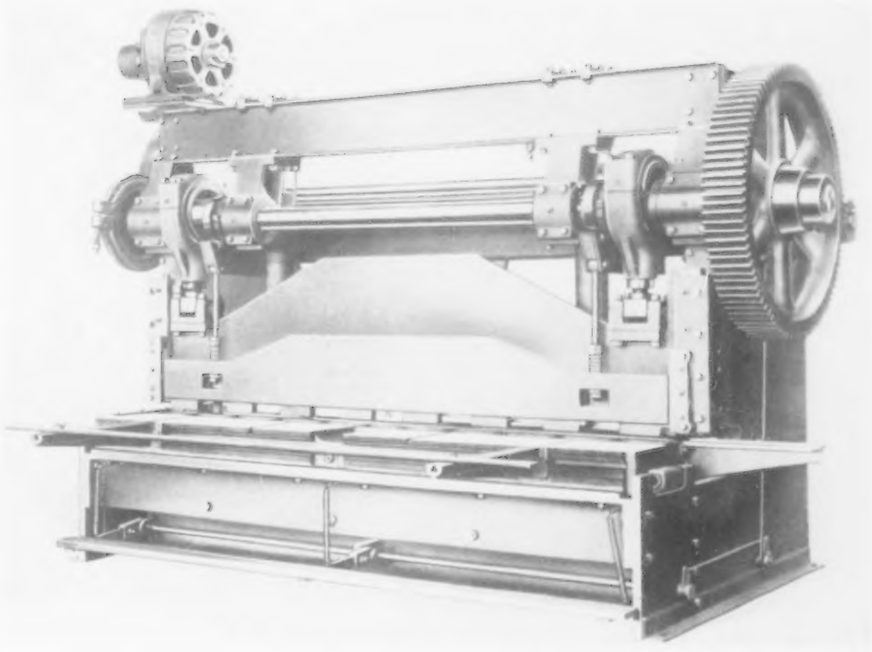


WEIGHING but 38,000 lb., this 600 ton forging press is of welded steel construction. Due to its light weight and because it does not extend below the floor line, it may be picked up by crane and moved near a furnace, avoiding loss of heat and work transportation. These presses are used for hot pressing, bottoming, sizing or coining and pressure finishing in one operation.

(Allsteel Press Co.)

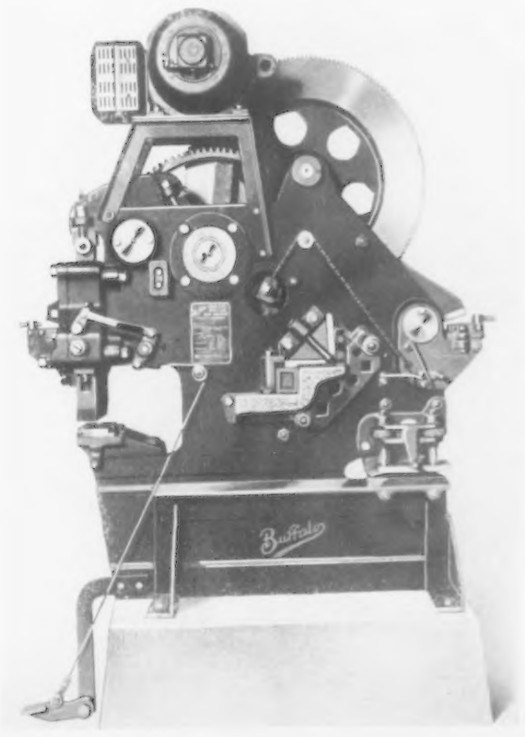
SHEARS AND BRAKES OF 1931

When Price Levels Decline Make Costs Decline Faster



MADE in eight sizes, for cutting soft steel from ¼ in. to ½ in. thick, the overdriven power shear illustrated employs both welded steel and cast iron members. To insure accurate cutting, a reinforced, welded steel holddown attachment is provided, which operates by cam from the main shaft.

(Peck, Stow & Wilcox Co.)



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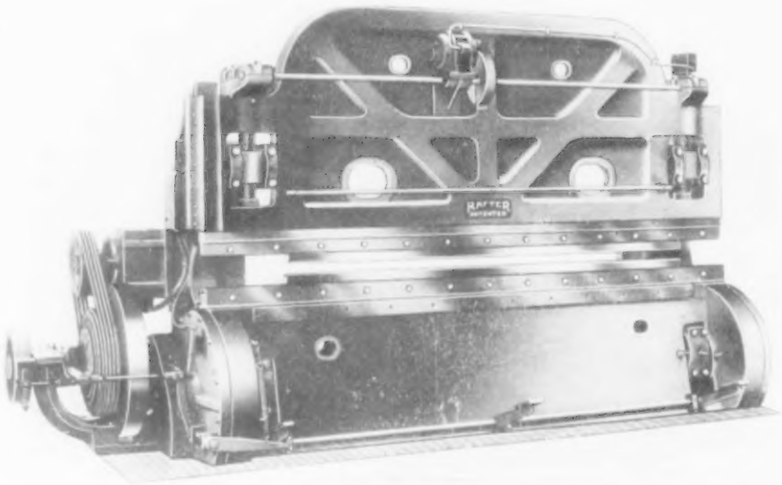
A COPING unit which can be replaced with a notcher in less than 15 min. is a new feature of the "universal iron worker" shown in the accompanying illustration. The coper is mounted on the shear end; for use in shops having considerable amounts of both notching and coping, the notcher can be installed as formerly on the punch end. In addition to the usual plate shearing and bar cutting operations, machines fitted with the new units will notch or cope plate ¼, ⅜, and ½ in. thick on the Nos. 0, ½ and 1½ models.

(Buffalo Forge Co.)

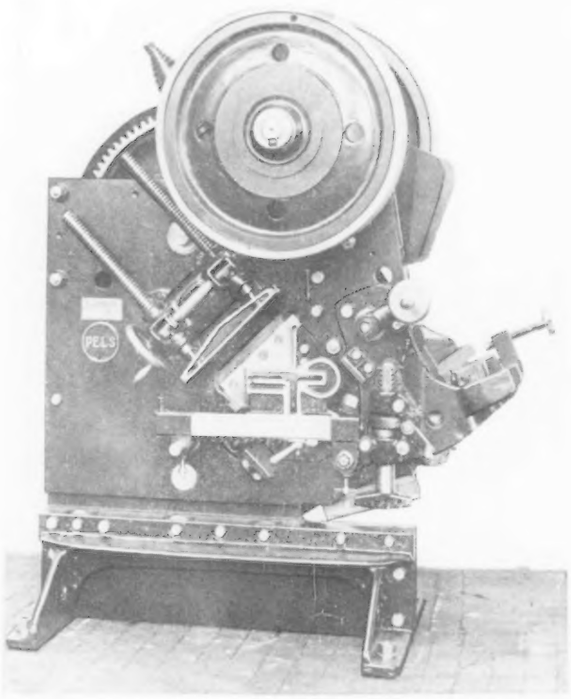
SHEARS AND BRAKES OF 1931

Knowledge Is Power in Making Replacement Decisions



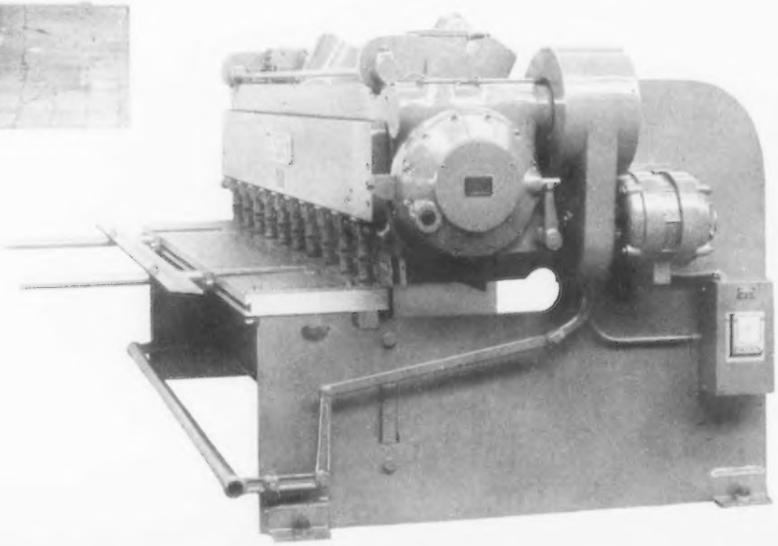
THIS 200 ton capacity press-brake employs a departure in principle in that power is applied from below, the ram being pulled into the work instead of being pushed into it from above. All of the drive is attached to or contained within the base, there being no drive mechanism on the upper part of the machine.

(Farrel-Birmingham Co., Inc.)



THIS new all-steel squaring and slitting shear is of rolled plate construction. It is equipped with hydraulic holddowns which clamp the sheet with uniform pressure. Exceptional operating speeds are provided. A deep horizontal steel knife brace, adjustable at 12 in. intervals insures knife alinement.

(Cincinnati Shaper Co.)



TO meet the plate and other shearing requirements of welding shops, where punching for rivets is not required, the machine shown has been developed. It includes a cutter in a diagonal slide for angles, tees, bars, etc., making it possible to bevel shapes in a horizontal position. Beams, channels and other sections, as well as very heavy flats, are cut with special knives, easily installed. The built-in notcher is interchangeable with a coping device.

(Henry Pels & Co.)

IMPROVEMENTS IN FORMING AND ASSEMBLING PRESSES

STEEL drum bodies are flanged and corrugated through progressive expansion action in this semi-automatic machine of the expanding jaw type. This method of corrugating does not affect the thickness of metal in the drum bodies. The operations resize the drums at each end. From 5 to 6 finished drum bodies are produced per min.

(E. W. Bliss Co.)

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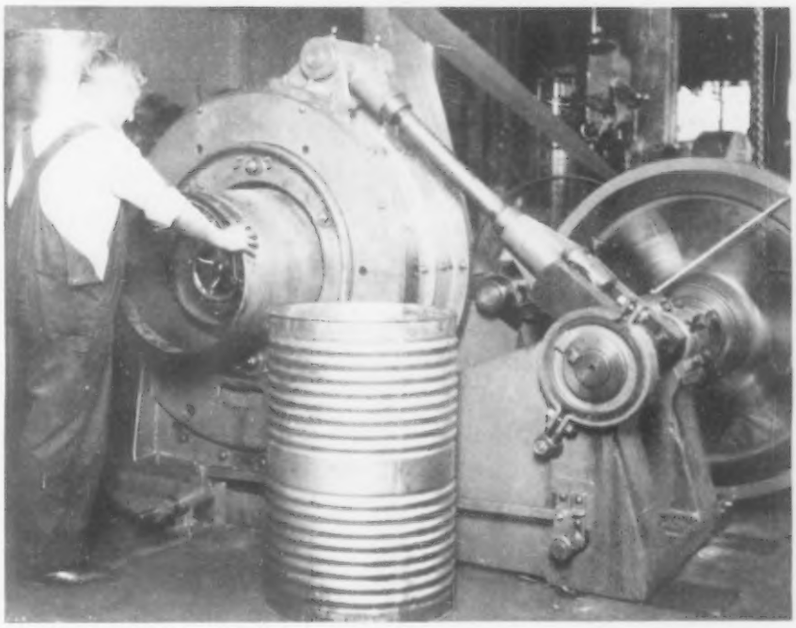

METAL shells up to 6 in. diameter and 6 in. long are automatically threaded in this thread rolling and trimming machine. In addition to rolling and trimming, beading, knurling, scoring and flat side rolling operations are handled by simple tool changes.

(V&O Press Co.)

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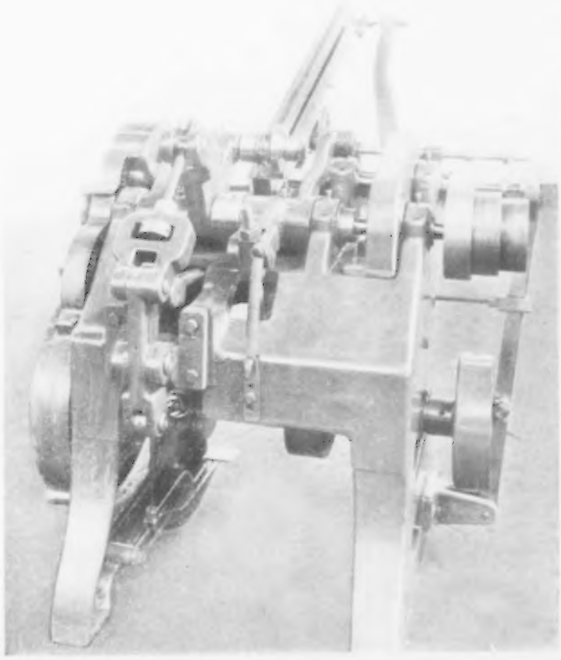
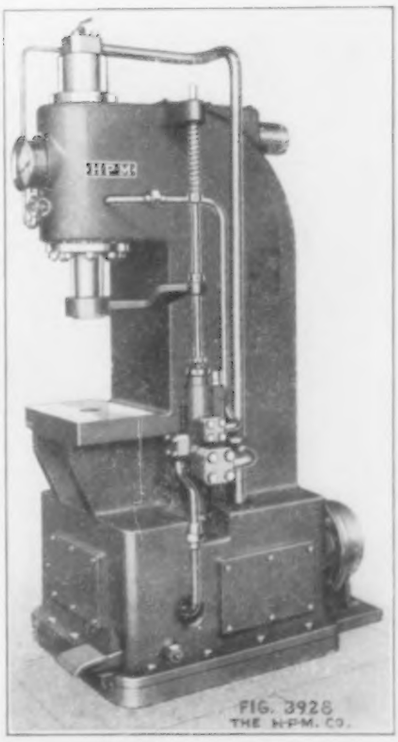


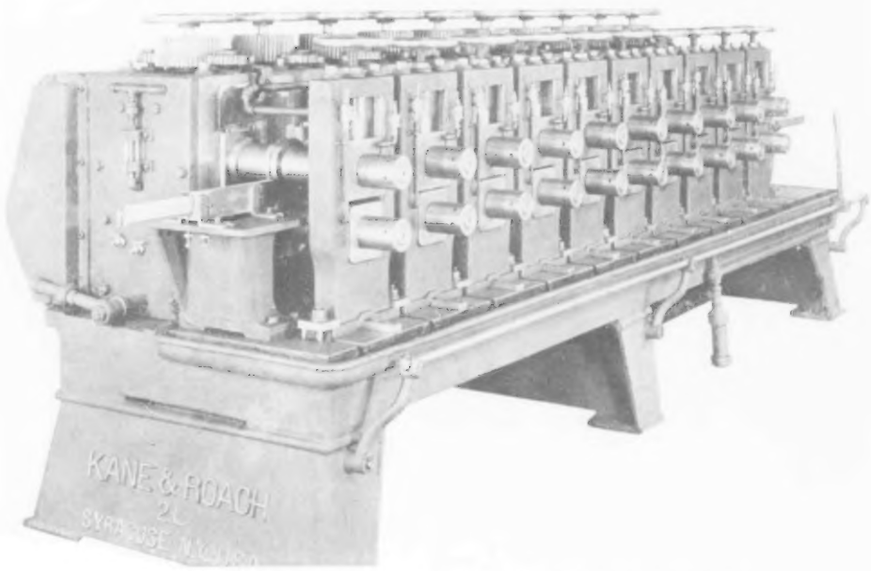
THIS oil pressure assembly press (at right) is designed especially for production jobs and to equalize operations in sequence. The operating units such as motor and oil pump are mounted upon the base, and oil storage is provided in the frame. Rapid approach is provided through two speeds. It is made in seven capacities ranging from 15 to 200 tons.

(Hydraulic Press Mfg. Co.)



IMPROVEMENT IN FORMING

Improved Machinery Has Multiplied Men's Jobs



A NEW line of cold rolled forming machines is exemplified by the machine shown in this illustration. The idea back of the design is to provide a basic construction with maximum adaptability, through individual changes, to specific jobs. The machine shown here is in use by the U. S. S. R. for hemming running boards on the Ford model A.

(Kane & Roach, Inc.)

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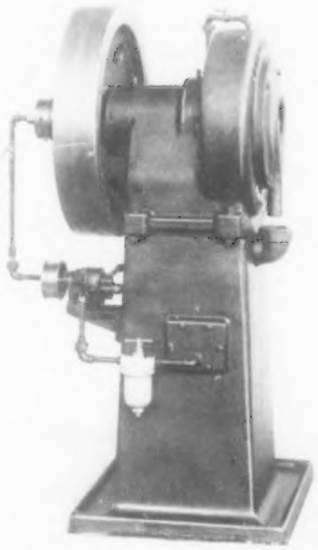

WASTE of stock is eliminated by this gear blank forming machine, which coils ⅜ by 1-in. tough alloy steel stock edgeways into 14-in. rings. These are then welded and used as blanks for Ford starter gears. A production of 25 rings per min. is obtained. Stock is fed from 400-lb. bundles, and the operation is essentially automatic.

(Sleeper & Hartley, Inc.)

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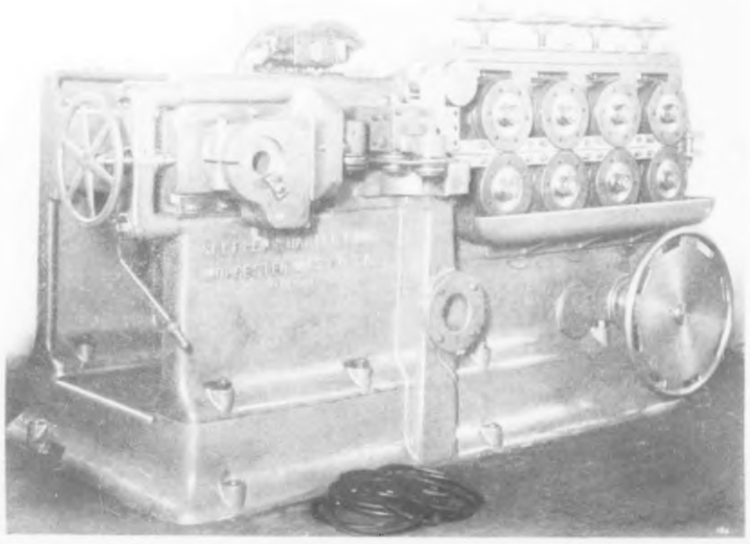
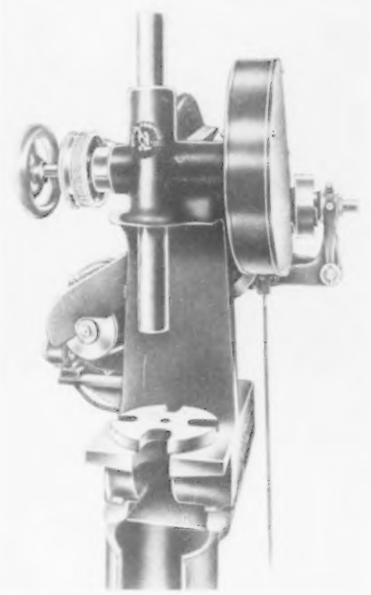


SPECIAL alloy steels are used for the dies and other working parts of the new line of swaging machines, one of which is shown in the picture above. Timken bearings are used for spindle mountings. Capacities range from 3 16 in. to 1½ in. diameters.

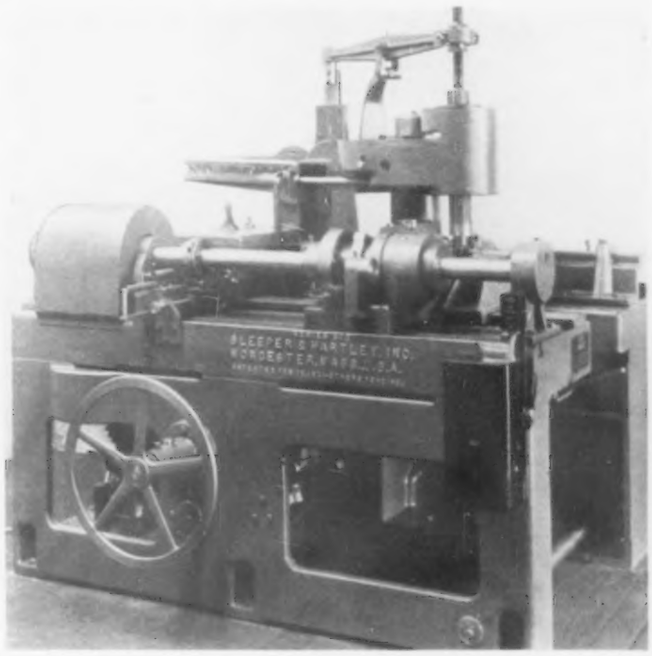
(Langelier Mfg. Co.)

AND ASSEMBLING PRESSES



A DEPARTURE in arbor press design is shown in this motor-driven machine of three tons capacity. An ½ hp. motor drives the ram, which is controlled by a friction clutch and has optional hand and foot controls.

(Greenerd Arbor Press Co.)



HIGH speed automatic production of heavy wire torsion springs has been obtained with this machine, which coils wire ranging from No. 14 to ¼ in. diameter. In the smaller sizes, it produces springs having up to 50 coils at a rate of 20 per min. Coils to 4 in. outside diameter can be wound.

(Sleeper & Hartley, Inc.)

AUTOMOBILE bodies and ash cans look alike when they emerge from this hydraulic scrap metal baler, a triple compression machine which utilizes three sets of rams in three directions. The bundles produced do not exceed 20 in. in any direction.

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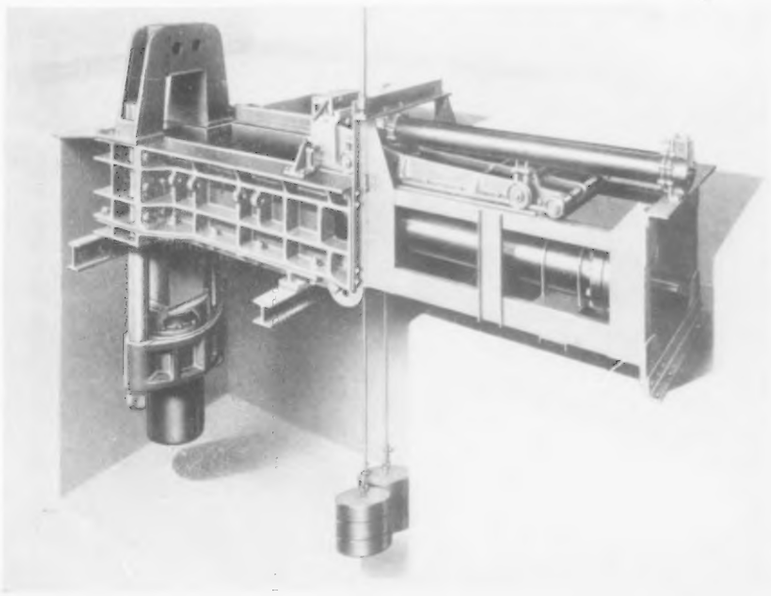
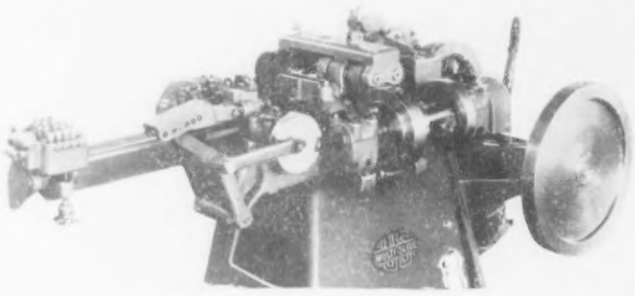
(Galland-Henning Mfg. Co.)

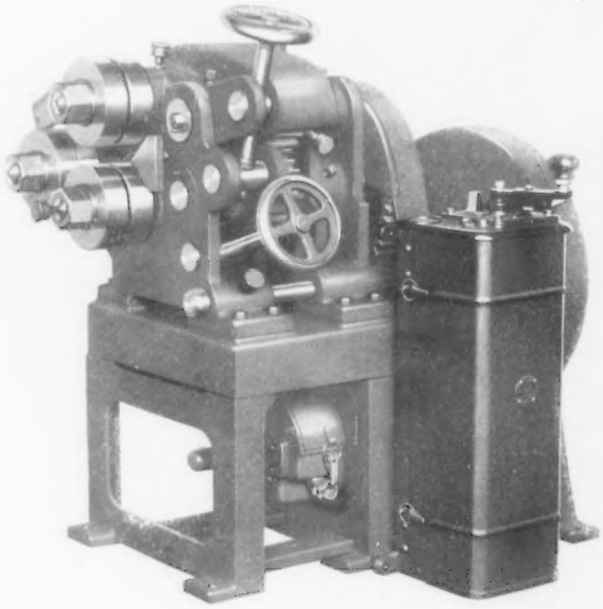


IMPROVEMENT IN FORMING AND ASSEMBLING PRESSES



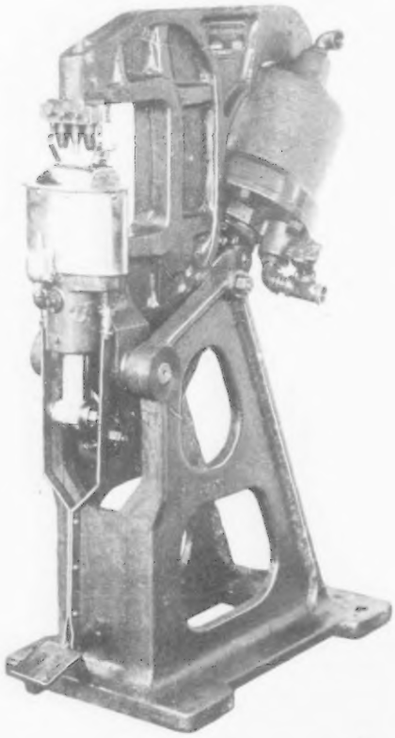
INTRICATE designs, requiring many progressive operations on ordinary presses are produced rapidly and automatically on this multi-slide forming press which operates on coiled stock. It is made in five sizes including four floor and one bench type.

(U. S. Tool Co., Inc.)



THIS riveter is particularly suited to assemblies that are difficult to fit and to hold together by hand. For in addition to riveting the work, the machine acts also as an assembling fixture. Parts are clamped firmly by power, the fixture supporting, locating and clamping the parts until the rivets are driven. The operator's hands are free.

(Hanna Engineering Works)

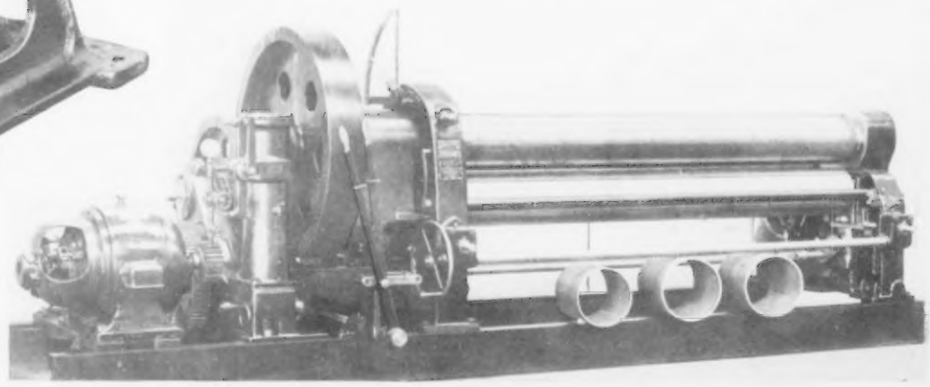


THIS angle bending machine can be used for bending angles and tees, "leg in or leg out"; flats on flat or on edge; round bars, pipe and other special shapes. Since the two front rolls are feed rolls, the work may be reversed between passes, reducing the "flat" on the ends.

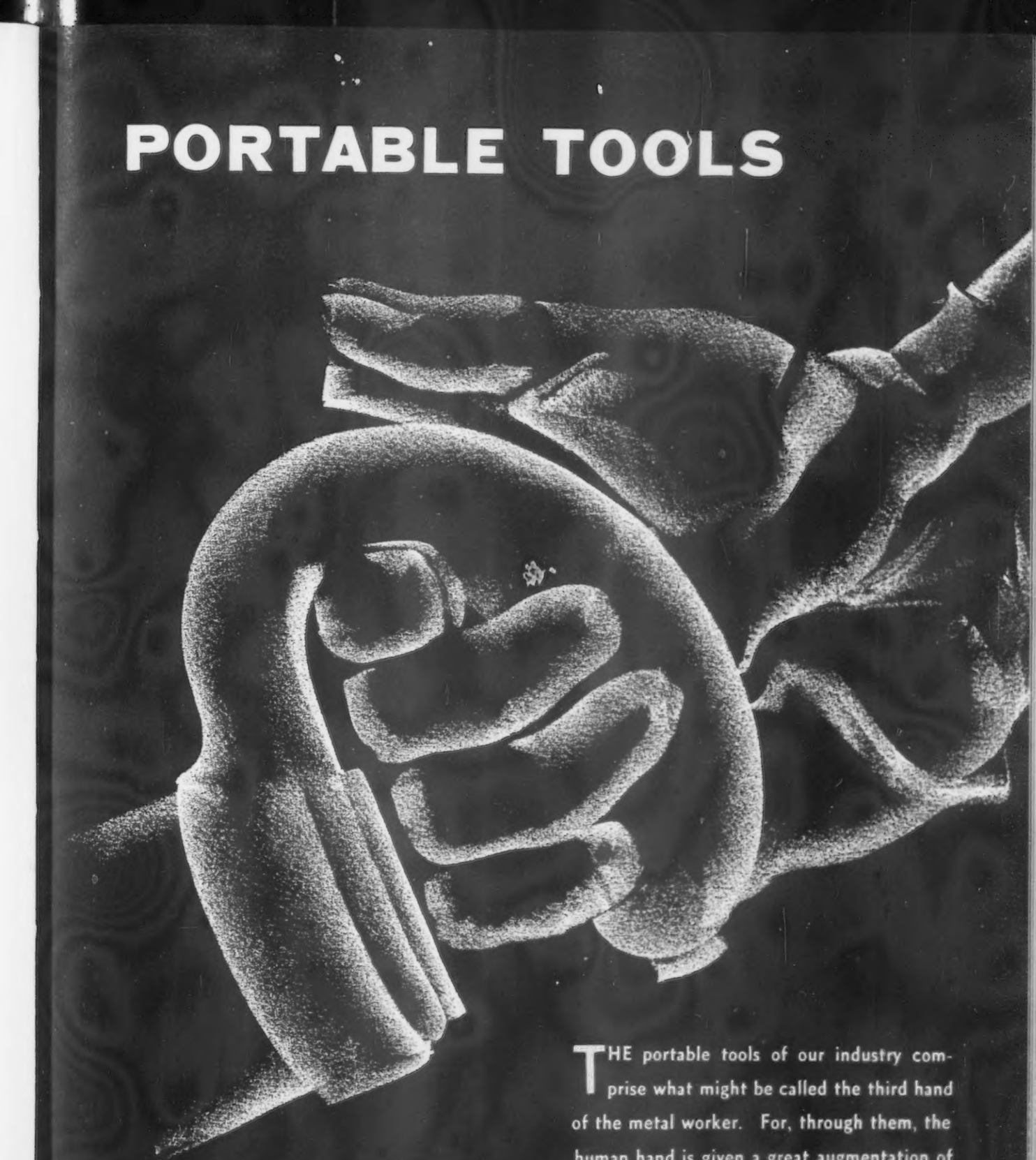
(Hendley & Whittemore Co.)

"UNILATERAL" plate bending rolls, shown below, are built in various sizes, the largest one taking 1-in. plate in lengths up to 20 ft. The machines are designed to roll plates to the ends as far as required in practice without prebending by auxiliary methods and to form the smallest possible diameters. Rapid operation is a feature.

(Schatz Mfg. Co.)



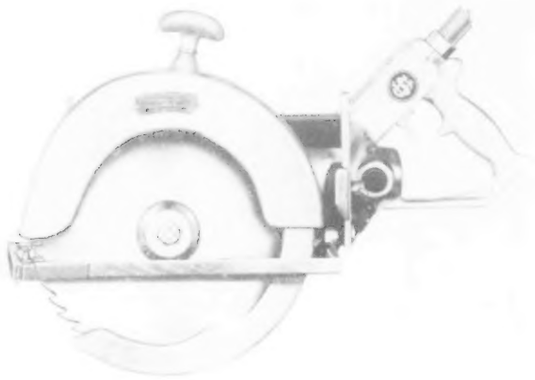
PORTABLE TOOLS



THE portable tools of our industry comprise what might be called the third hand of the metal worker. For, through them, the human hand is given a great augmentation of power, ability and skill.

This form of mechanization, a specialized one, was well emphasized in the developments of 1931. For example, witness the new portable tools shown on the following pages.

NEW RECRUITS TO



TWO easy adjustments set this portable electric saw for any depth of cut to capacity or for any angle to 60 deg. A blower keeps sawdust away and automatic guards protect the operator.

(United States Electrical Tool Co.)

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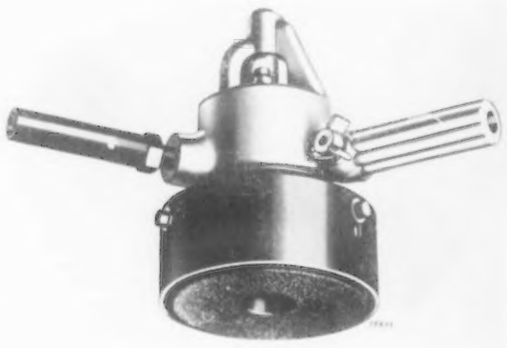
THE electric drill and reamer illustrated is of the "high frequency" type, which means that it is free from armature windings, brushes and commutators. Drilling capacity is 1⅛ in., speed 330 r.p.m. and weight, 29 lbs.

(Independent Pneumatic Tool Co.)



THE "Multi-Vane" grinder is a light weight high production tool for grinding, sanding, polishing and wire brushing. It operates on compressed air and is made in various sizes and types.

▲▲▲ *(Ingersoll-Rand)*

TWO rotary air motors furnish in excess of 1 1/3 h.p. each for driving this new "Buckeye" portable belt sander. Applicable to flat, concave or convex surfaces.

(Buckeye Portable Tool Co.) ▲▲▲

Intelligent Replacement Will Put Idle Dollars to Work

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THE FLYING SQUADRON

OPERATED by rotary motor, this "CP" No. 11 drill weighs but 3½ lbs., yet will handle up to ¼ in. drills. Particularly adapted for drilling tell-tale holes.

(Chicago Pneumatic Tool Co.)

A NEW type of high speed pneumatic chipping and light riveting hammer is shown here. Its one diameter piston is the only moving part. Also a "Hercules" development.

(Buckeye Portable Tool Co.)

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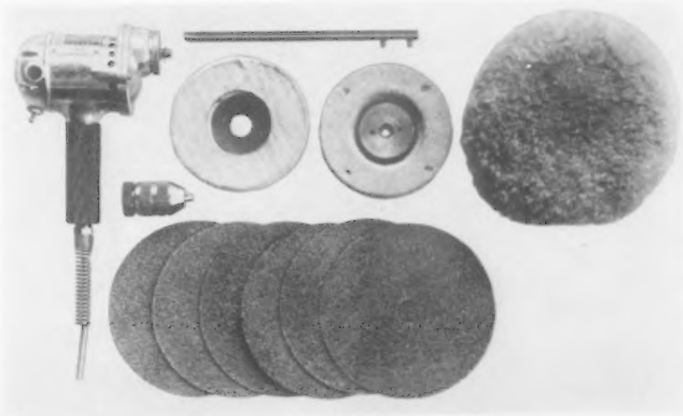
Who Pays for Improved Equipment? The Man Who Does Not Buy It

▼ ▼ ▼

TWO new "Syntron" electric hammers were produced during the past year. One of them is a high speed, light weight type particularly designed for scaling rust and paint, the other a heavier high speed model designed for dressing metal preparatory to welding.

(Syntron Co.)

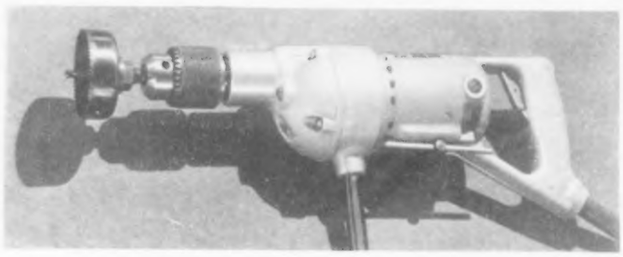


KNOWN as the "U. S. Combination Polisher," this new electrical tool is a combination drill, sander, buffer and polisher. It is provided with a keyless chuck, permitting quick tool changes.

(United States Electrical Tool Co.)

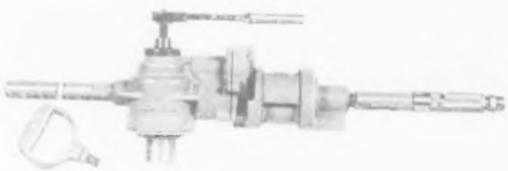
NEW RECRUITS TO THE FLYING SQUADRON

Low Cost Levels Command Volume and Profits



THIS slow speed drill is particularly adapted for drilling hard metals and alloys such as chrome nickel. It has a ½ in. drill capacity and is speeded at 200 r.p.m.

(Wappat, Inc.)



A RECENT addition to the "Hercules" line is represented in this heavy duty pneumatic drill and reamer. Intended primarily for structural shops, railroad shops and heavy machinery building plants.

(Buckeye Portable Tool Co.)

WHILE not strictly a portable tool, the flexible shaft of this new electrical screw driver introduces the convenience of taking the tool to the work.

(R. G. Haskins Co.)

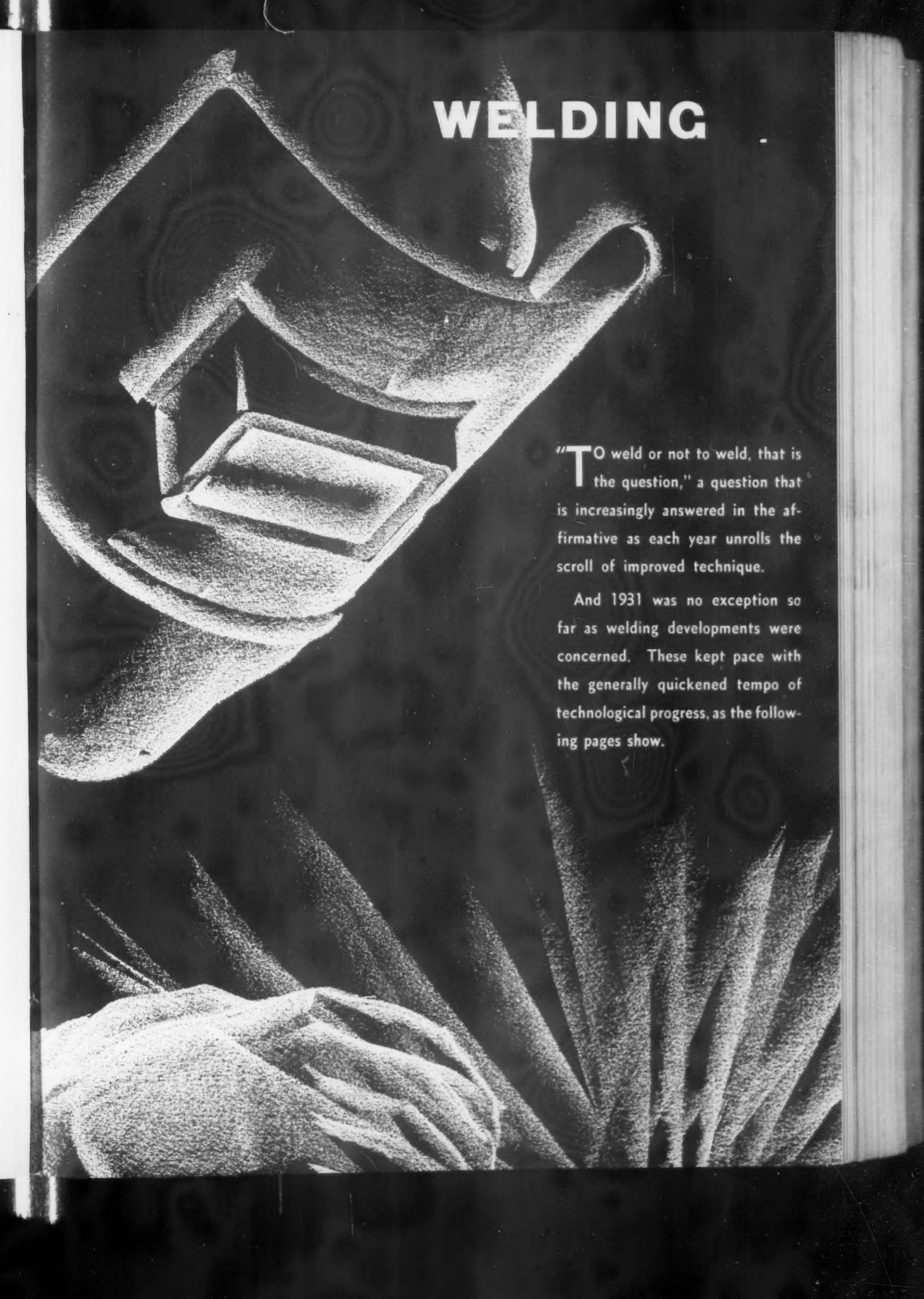
A ½ h.p. high frequency motor, operates this new high frequency grinder on a current of 220 v., 180 cycles, 3 phase. The spindle speed is 5400 r.p.m., and 6 in. diam. wheels are used. The weight is 20½ lbs.

(Standard Electrical Tool Co.)

OPERATING at from 500 to 5000 strokes per min., this new "Kipp" air filer is particularly adapted to precision filing on tool room work. A variety of files and hones adapted to it are offered.

(Madison-Kipp Corpn.)

WELDING



"TO weld or not to weld, that is the question," a question that is increasingly answered in the affirmative as each year unrolls the scroll of improved technique.

And 1931 was no exception so far as welding developments were concerned. These kept pace with the generally quickened tempo of technological progress, as the following pages show.

WELDING MADE AMAZING

THE year 1931 will be remembered by welding engineers as seeing the fruition of two technical programs which will materially hasten the universal commercial application of resistance, gas, arc and other welding processes in every type of construction. Not that these programs embraced all of the welding processes, and every type of construction, for they did not, but because their sponsors were two national technical societies and the personnel of the committees was such as to command attention of capital, management and the engineering fraternity throughout the world.

Boiler Code Committee's Program

The first of these programs has been evolving in the Boiler Code Committee of the American Society of Mechanical Engineers during the past twelve to fourteen years, and although in this evolutionary period, considerable divergence of opinion and many heated discussions ensued, nevertheless, on June 26, 1931, the twenty-four members of this Committee unanimously adopted codes for the construction of completely welded power boilers and unfired pressure vessels. Furthermore, not only were both codes approved by the council of this society on July 7, 1931, but for Class 1 pressure vessels, no limits were imposed as to the size of the vessel which may be welded, the thickness of the shell, its operating pressure, or the use to which it may be put.

It was only possible to reach this momentous decision by every member of the committee's being fully convinced that it is now possible under competent engineering g u i d a n c e, (wherein all factors, including plant organization, material, [base metal and filler metal], design, procedure control, training and qualification of welders for each process and application, etc., are given proper consideration) consistently to produce welded joints the properties of which are equal or superior to those of any riveted joint. It was specified in the codes that sample joints similar to the joints used in the vessel be welded and tested at the time the vessel is constructed to demonstrate that the requirements of the codes have been complied with. The codes also require that the completed vessel be subjected to specified non-destructive tests.

The second of these programs was the publication by the American Welding Society in September, 1931, of the "Report of Structural Steel Welding Committee of the American Bureau of Welding." This report was the result of an investigation extending over a period of five years and which "had as its principal object the determination of the stresses that may be safely used in the design of welded steel structures fabricated under ordinary commercial fabricating shop conditions. The participants in the investigation included three steel mills, 39 fabricating shops, 61 welders, 18 inspectors and 24 testing laboratories, and the work was distributed over the Central and Eastern portions of the United States." It embraced the "welding and testing of 1098 specimens in connection with the qualification of the welders and 1395 specimens in connection with the investigation proper. The latter involved 55 elemental forces of joint in 169 sizes."

The conclusions reached by the committee were *first* that the shear, tension and compression unit stresses specified in the American Welding Society's Code for Fusion Welding and Gas Cutting in Building Construction are "safe and reasonable, provided the welder has been qualified and provision has been made for bending stresses that may be introduced due to eccentricity"; and *second* that "in commercial practice, a fusion welded joint may be expected to have a strength within 12 per cent of a general average for that type of joint provided the welder has attained the stated qualifications." In other words, the results of this investigation presented author-

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MOMENTOUS decisions by engineering societies' committees gave welding increased and well deserved recognition in 1931.

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THE old slave galley typifies the crudeness of ancient means and products.

PROGRESS IN 1931

By JAMES W. OWENS
Director of Engineering
Welding Engineering & Research Corpn., New York

CONTINUOUS improvement in welding equipment and materials marked the record of the past year and still further enlarges the capabilities of this art.

itative proof that any welder passing the required qualification tests would consistently make an equally sound weld in a commercial structure.

That welding is filling an important place in the production of better products at lower costs and that it will play an important part in the economic rehabilitation of industry are clearly evident because, in spite of the depression, the use of the process has continued to spread throughout all industries—building construction, residence construction, ship construction, pressure vessel construction, aircraft construction, pipe line construction, machinery construction, etc.

It would be impossible to specify in detail the recognition obtained or to list all of the applications of the various welding processes in industry during 1931, but it should be noted that in the United States to date 114 cities and municipalities have adopted, in whole or in part, the American Welding Society's code for fusion welding and gas cutting in building construction; that numerous naval and merchant ships have been partly welded; at least 183 buildings and 46 bridges have been wholly or partly welded, (one building being 20 stories high); at least 40 barges, lighters, tugboats, ferryboats and thousands of miles of pipe lines have been completely welded; that over 500,000 tons of steel have already gone into fusion welded pressure vessels for the gas oil cracking and the chemical industries, (some of these vessels having a 7½ in. wall thickness and operated at temperatures and pressures as high as 500 lb. per sq. in. and 1000 deg. F.), that the first completely welded boilers ever to be installed on a naval ship occurred during 1931, and that approximately two-thirds of all the work contracted for by a large boiler manufacturing plant is of welded construction.

Notable Improvements of 1931

Of course, this steadily increasing number of applications, many of which have not even been referred to, is due, in no small measure to a continuous improvement by manufacturers of welding apparatus and materials. Some of the notable improvements in 1931 are *first*, the development of resistance welding machines for the flash welding of 60 to 80 sq. in. and the making of spot welds having a cross sectional weld area of 4 sq. in.; *second*, the use of vacuum tubes and other mechanisms for controlling time, pressure and/or current in flash, spot, seam and other resistance welding processes, particularly in the welding of alloy steels and the aluminum alloys; *third*, increased use of multiple flame gas welding torches and the actual commercial use of an oxy-acetylene welding process wherein a carbonizing flame is used and wherein the joining of the weld and base metals is accomplished by a sweating operation without the actual melting of the joint surfaces: *fourth*, improvement in the properties of the weld metal obtainable with metal arc welding by the use of commercial coated and covered electrodes due to improvement in the electrodes themselves; improvement of the arc characteristics of single-operator motor-generator sets; and increased use, under very definitely controlled conditions, of alternating current as a source of arc energy.

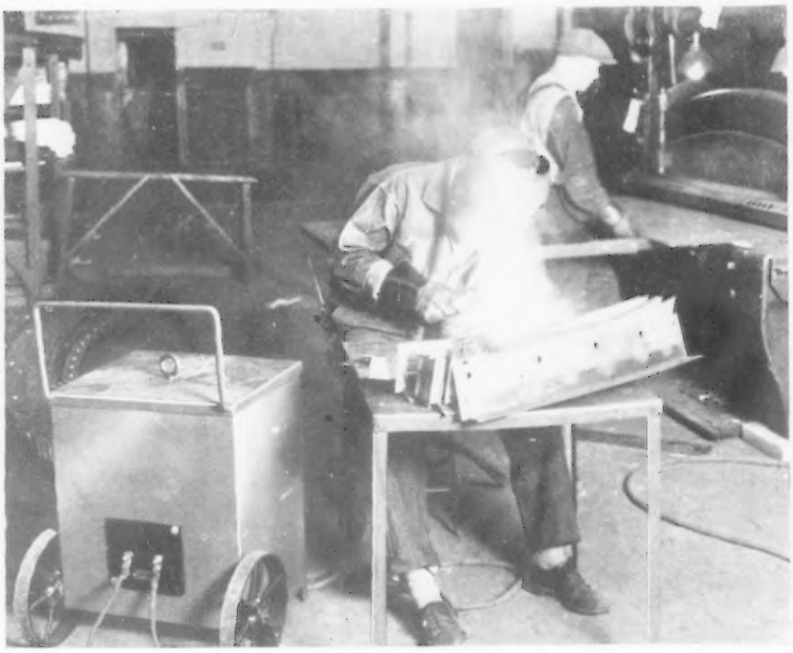
In the field of gas cutting, multiple torches have been more extensively applied to automatic mechanisms for the simultaneous cutting of several pieces from the same pattern.

In conclusion, considerable progress has been made in the commercial welding of the alloy steels and aluminum alloys by the arc and gas processes, also in a more general utilization of the various non-destructive methods of testing welds, viz: the X-ray, the gamma-ray, magnetic (including the iron dust method) and the stethoscope.

THE welded steel ship is an example of technological development.

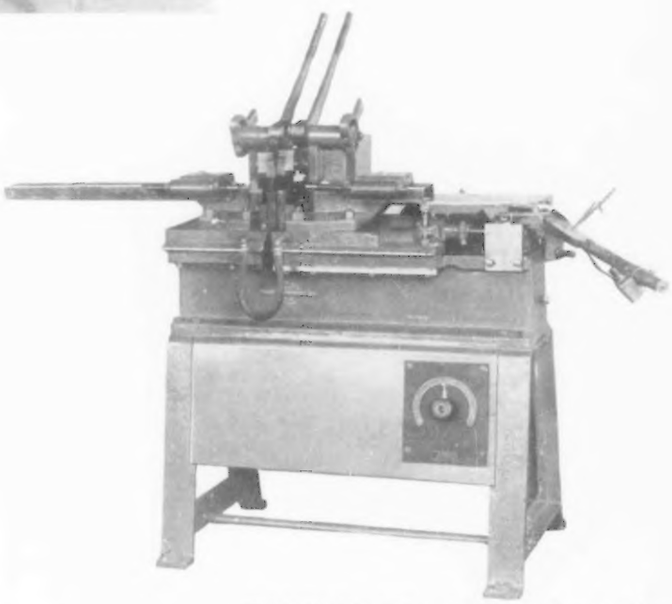
HIGH SPOTS OF

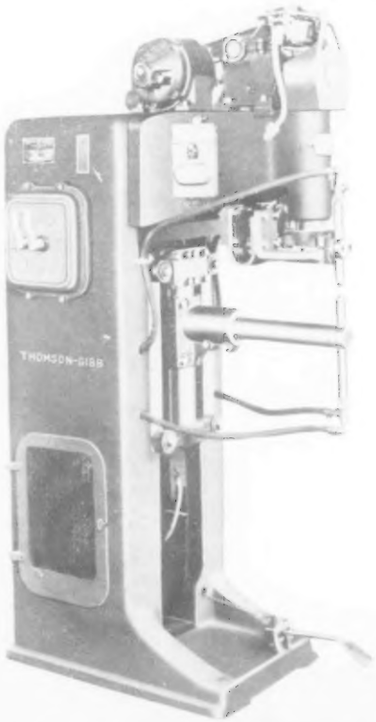
Reduced Volumes Turn the Spotlight on Unit Costs



THIS arc welding set operates with alternating current and is for use on thin gage material, such as used for metal furniture, cabinets, etc., and in aircraft work. Either bare or coated electrodes, 1/32 to 1/8-in. diameter, may be used; operating current ranges from 8.5 to 125 amp. Many ferrous alloys commonly welded with reversed polarity direct current may be welded. The set has also been employed for welding aluminum. Operating cost is put at about 15 cents an hour.

(Westinghouse Electric & Mfg. Co.)





SMOOTH mechanical action at either low or high speeds, 20 to 30 or 200 to 250 spots per min., is a feature of this No. 1 press type spot and projection welder. Flexible design facilitates furnishing special throat depths, various speed ranges, etc. Transformers of different ratings can be supplied, and the various adjustments of the lower and upper arms adapt the equipment for almost universal application.

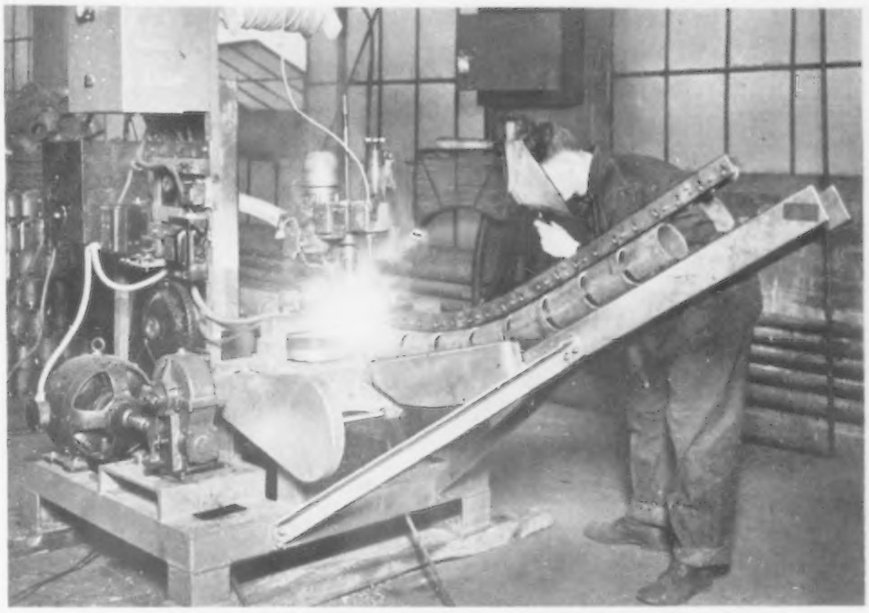
(Thomson-Gibb Electric Welding Co.)

FURNISHED either with hand-toggle pressure device and hand-operated clamps, or with motor-driven pushup and air clamps, this flash welder is for stock up to 3/4 sq. in. or more. The water-cooled transformer is mounted at the rear, out of line of the flash and dirt from the welds, and transformers up to 100 kva. may be installed without disturbing the balance of the machine. The hand-operated welder may be converted into a power unit by attaching the mechanical drive; when the machine is power driven the welding cycle is automatic.

(Thomson-Gibb Electric Welding Co.)

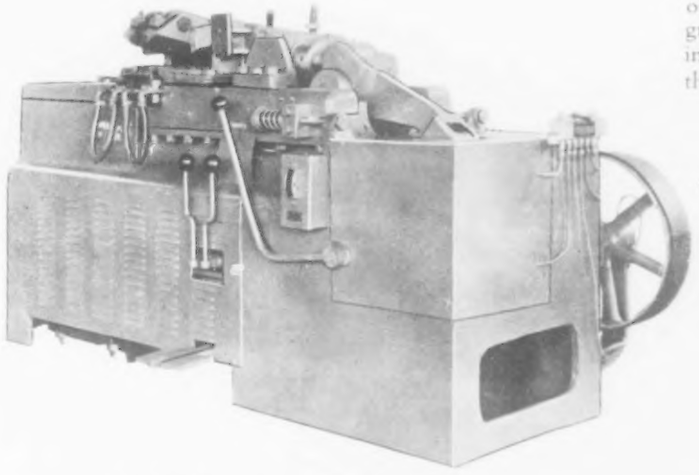
THE HOT SPOTS

Today's Replacements Will Rule Tomorrow's Profits



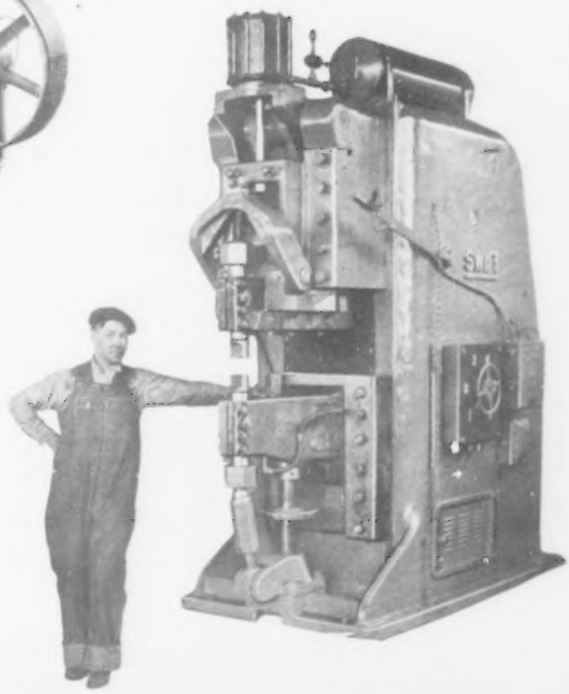
ABOUT 240 starter frames are welded an hour in a shielded arc by the Electronic Tornado process. Operated by two men, four of the units can maintain an hourly output of more than 8000 frames at an operating cost of less than ½ a cent a frame. The starter frames, made of 5/16 or ⅜-in. steel plate, are fed into the machine by gravity; as they pass under the automatic welding head, the edges are squeezed together. In this welding process, the carbon arc is used without filler metal.

(Lincoln Electric Co.)

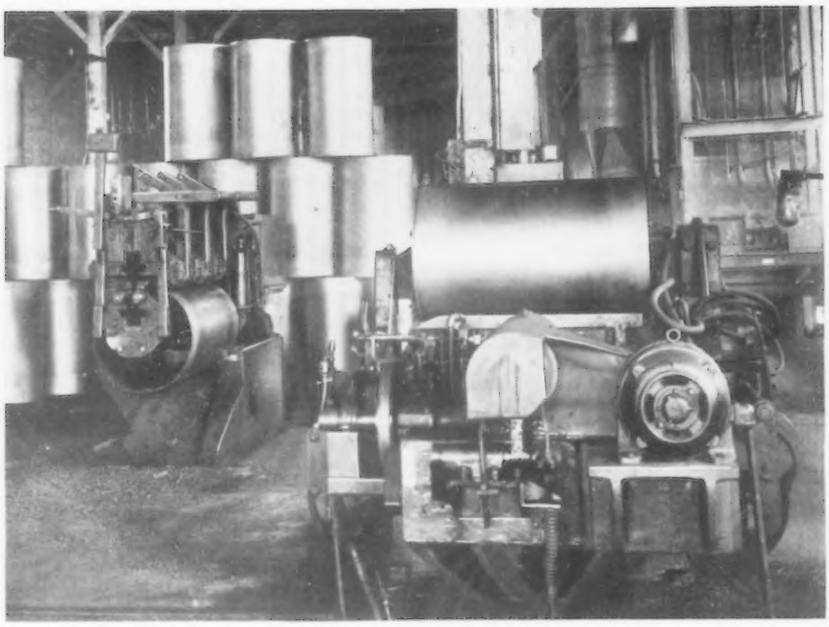


THE heavy-duty spot welding machine at the right may have either a 600 or 800 kva. transformer as required. The machine is motor driven and the upper movable head is actuated by a cam, driven through a worm and worm gear running in a bath of oil. The cam, in turn, operates a toggle pressure device. Both the pressure on the work and the speed of operation are adjustable. The heavy-duty cam-operated automatic flash welding machine shown above is for use on rims and similar pieces.

(Swift Electric Welding Co.)



HIGH SPOTS

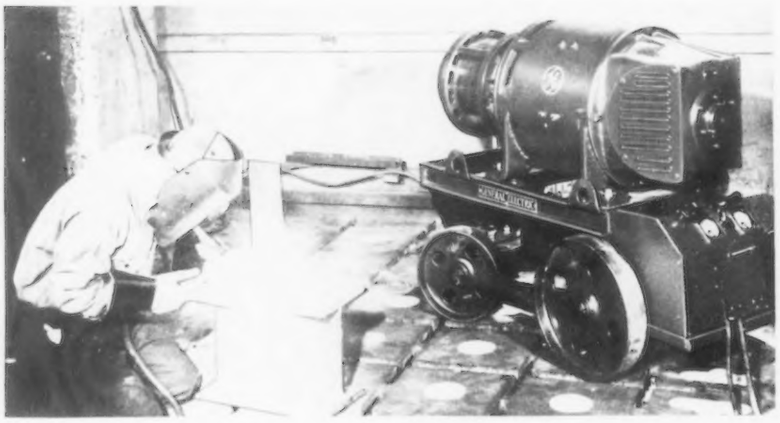


ONE operator and two helpers weld and "flash strip" 110 barrels an hour with this equipment. The cost is put at about 2½c. per barrel, not including overhead. The flash strippers remove the surplus metal left along the weld made by the resistance welder. A reciprocating double ram carries roughing and finishing tools. Air clamping is provided, and the cutting cycle is completely automatic.

(Federal Machine & Welder Co.)

INTERMITTENT line and spot welding with interruptions as high as 1000 per min. are obtainable with this control equipment, which uses Thyratron tubes for interrupting current flow.

(General Electric Co.)

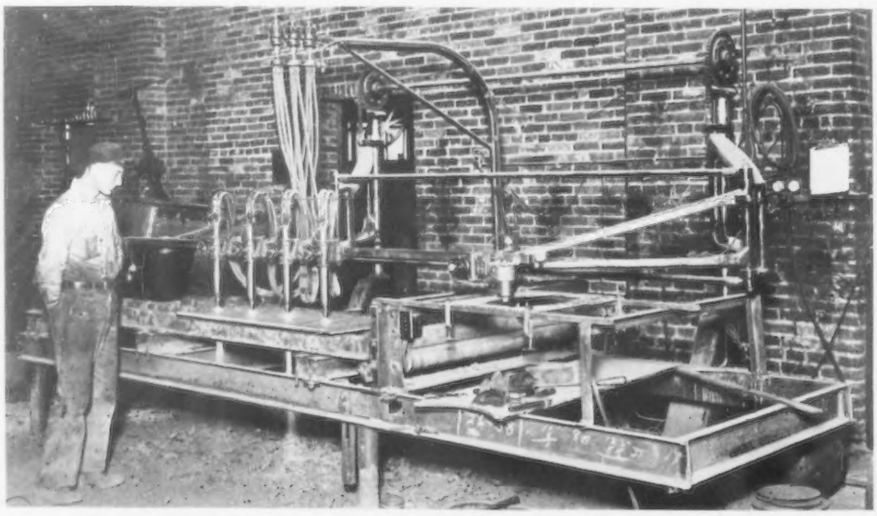


COMPACTNESS, light weight and improved welding characteristics feature these new arc welders, which are made in portable and stationary models, a.c. and d.c. types, and in several ratings from 100 to 600 amp. Features include flexible and stable arc; instantaneous voltage recovery; elimination of current surges; duplex voltage control; simplicity of operation; self-excitation and perfect commutation at all loads.

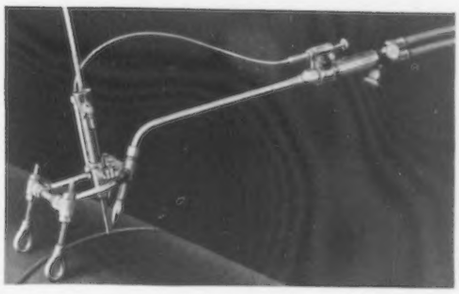
(General Electric Co.)

THIS Oxygraph equipped with four cutting torches and remote control enables the operator to cut four pieces simultaneously from steel plate or slabs.

(Air Reduction Sales Co.)



OF THE HOT SPOTS

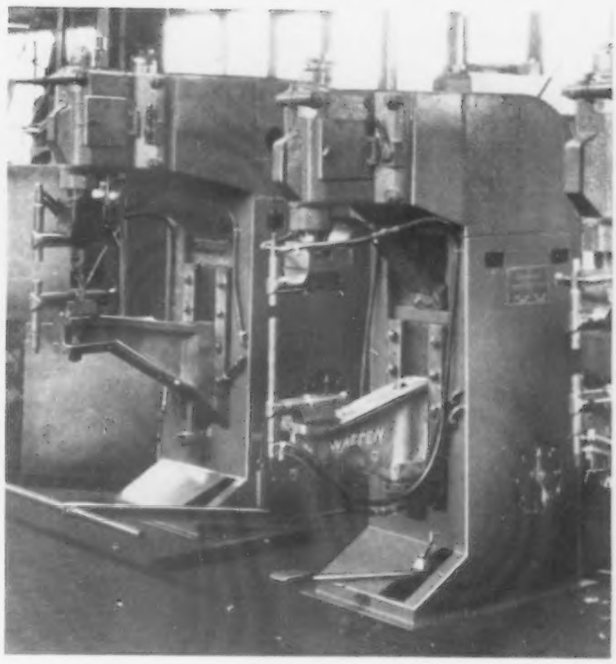


TWO separate flames are utilized in the Oxweld-21 Lindewelder, shown above. The upper flame preheats the rod nearly to the melting point, while the welding flame prepares the base metal for proper fusion with the weld metal and at the same time melts the end of the preheated rod into the welding puddle. The welding rod is fed automatically by gravity but may be raised or lowered by the trigger on the blowpipe handle. In overland pipe construction, it is stated that time required to make a weld has been reduced 40 to 60 per cent.

(*Linde Air Products Co.*)

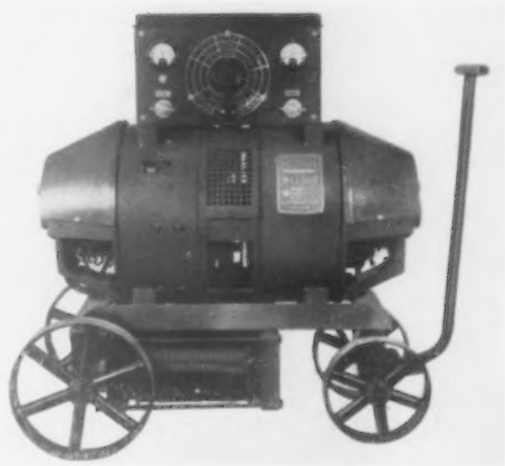
DESIGNED for welding copper, aluminum, zinc and other metals, the Micro-Weld butt welder here shown is joining 5/16-in. copper rods, which are later to be drawn in high-speed continuous drawing machines. No special preparation of rod ends is necessary. The flash, which occurs when the two ends of the rods come together, not only squares the ends by burning off projections but it results in an explosion which permits the two ends to be upset and welded in a temporary vacuum.

(*Micro Products Co.*)



DESIGNED to meet high-production needs, the spot and projection welders, illustrated, have a number of features making for flexible control and operation. These include current regulation by means of an auto coil giving 60 per cent regulation in eight equal steps, variable stroke welding head, and adjustable knee. Speeds range from 15 to 120 welds a minute.

(*Federal Machine & Welder Co.*)



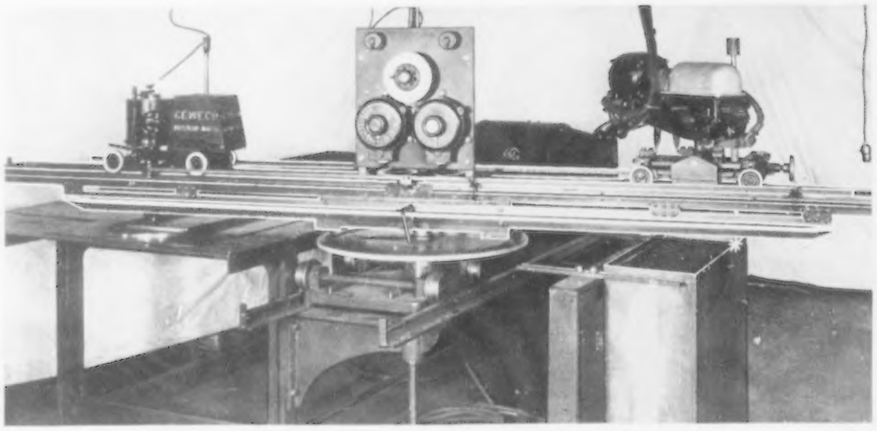
THIS 400-amp. Hobart triple-range diverter pole arc welder will deliver in continuous service, 450 amp. at 25 volts for use with bare or powder-fluxed welding rods, or 400 amp. at 40 volts for use with heavy coated "speed rods." Higher values up to 600 amp. are available for intermittent service. With a welding range of 60 to 600 amp., the set is adapted both for light and heavy work. Convenient control, through the "Unitrol" dial is a feature, while to use of the diverter pole principle is attributed unusual characteristics of the machine.

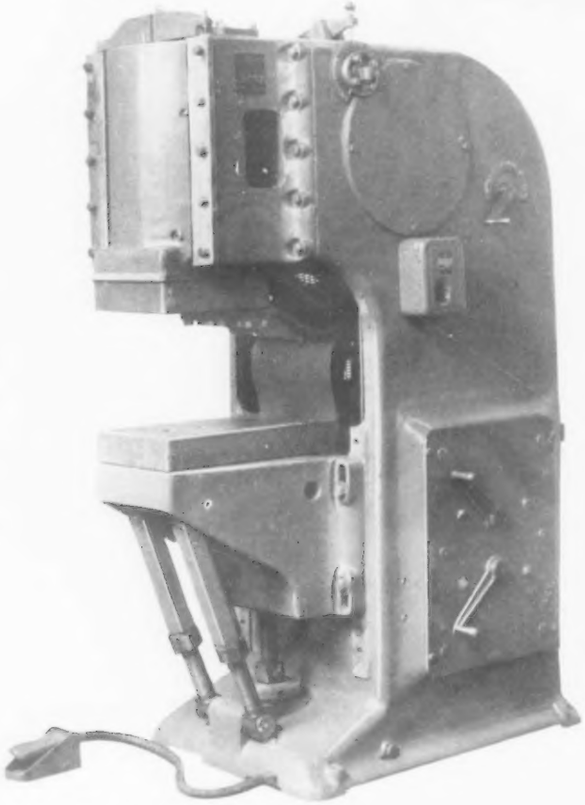
(*Hobart Brothers Co.*)

HIGH SPOTS OF THE HOT SPOTS

IN welding the tops and bottoms of 275-gal. oval oil tanks, these shape welding machines weld at a rate of about 40 linear inches per min. With about 220 in. of seam, 1/16 in. stock or 1/8 in. seam, the welding time is approximately 6 min. per tank, which compares with 15 to 30 min. welding time by hand methods formerly used. The arc welding heads are guided automatically.

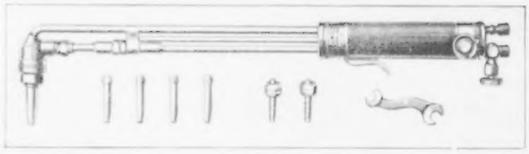
(General Welding & Equipment Co.)





LARGE numbers of projection welds can be made at one time by the machine pictured above. Transformer capacities range from 200 to 450 kva. and speeds from 7 to 54 strokes per min. Stroke length is adjustable.

(Taylor-Winfield Corpn.)

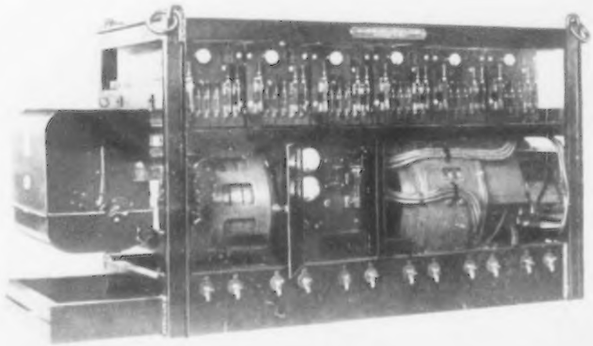


A SAFETY flash back chamber is built into the cutting torch shown above, and there is a back pressure valve to prevent backing up of fuel gas into the oxygen line. Metal-to-metal seating of the valves is a feature. The torches are made from brass and bronze bar stock, monel metal and nickel seamless tubing.

(Torchweld Equipment Co.)

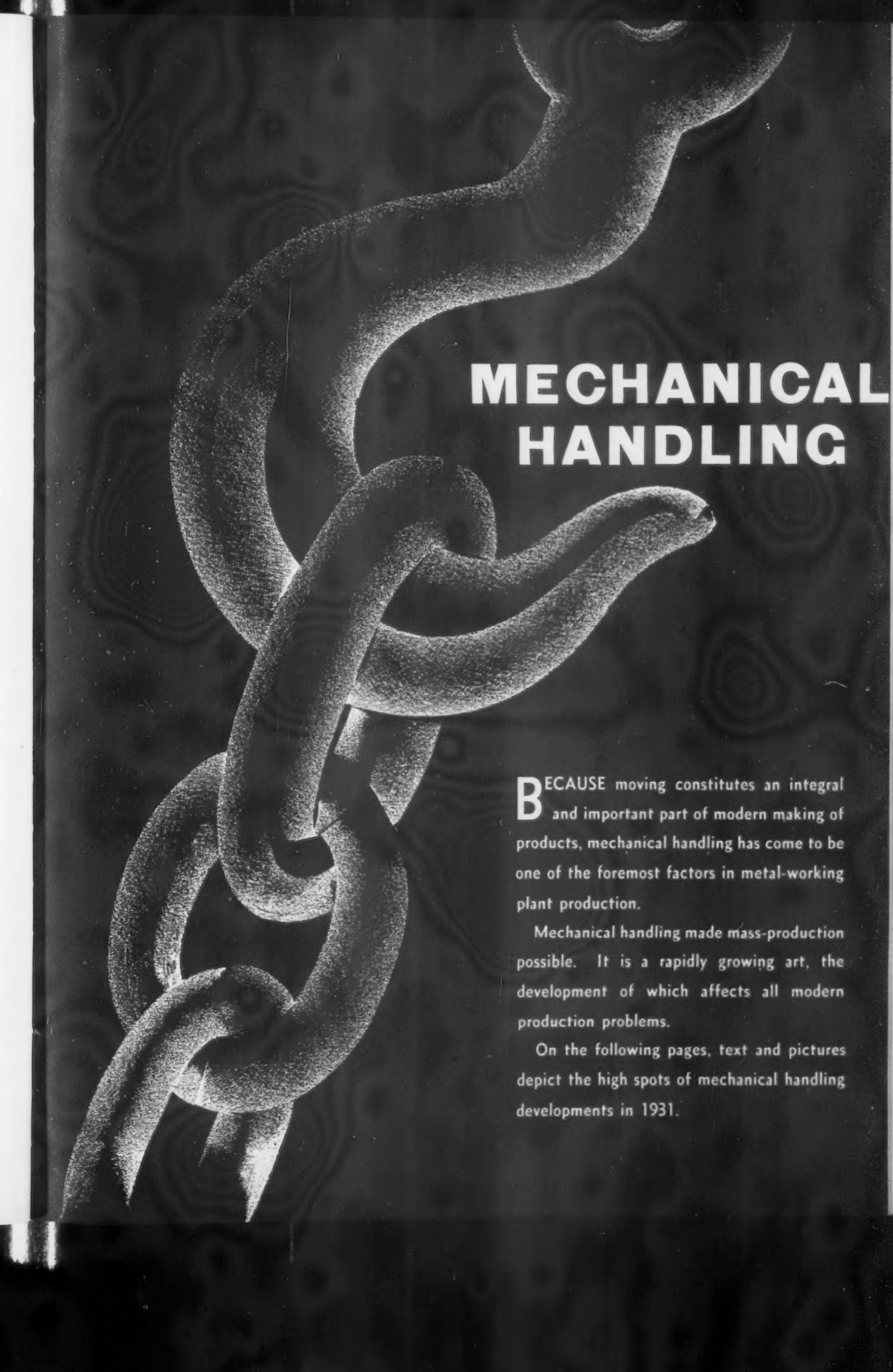
USE of stronger materials, bronze forgings, drop forged monel metal, etc., has permitted a reduction in size and weight of this Rego CC heavy-duty cutting torch, without sacrifice of strength or capacity. No mechanism is contained inside the torch handle.

(Bastian-Blessing Co.)



THIS constant-potential multiple-arc welder is a six-operator four-bearing unit, with a generator rated at 1000 amp. (one hour). Each control panel has a maximum capacity of 300 amp.

(Wilson Welder & Metals Co.)



MECHANICAL HANDLING

BECAUSE moving constitutes an integral and important part of modern making of products, mechanical handling has come to be one of the foremost factors in metal-working plant production.

Mechanical handling made mass-production possible. It is a rapidly growing art, the development of which affects all modern production problems.

On the following pages, text and pictures depict the high spots of mechanical handling developments in 1931.

MECHANICAL HANDLING

By MATTHEW W. POTTS
Secretary, Materials Handling Division of A. S. M. E., Sales Engineer, Alvey Ferguson Co.

THE materials handling industry is so diversified as to types of equipment that it is rather difficult to compile an accurate summary of progress over the short period of one year. Certain branches of this industry find it necessary to develop new devices continually while others have to develop systems of installations. To report fully the systems, except in separate descriptions, and for any individual to try to compile all of the progress made, is impossible, and the author therefore presents here outstanding achievements which have been brought to his attention.

Electrical Trucks Show Marked Development

This year has produced some marked developments in the electric industrial truck field. Through the courtesy of the Electric Industrial Truck Association the accompanying summary table on electric truck developments during 1931 is made available.

It will be noted that this branch of materials handling is somewhat similar to the automotive field and it is necessary for it to change design continually to accomplish shorter turning radii, thus permitting the trucks to operate in more congested quarters. This leads to more compact units and special features, such as telescoping uprights, which facilitate the movement of trucks from one building or department to another where headroom is limited to doorways and other overhead obstructions generally having a maximum of 8 ft. clearance.

As electric trucks are used for handling package materials in transportation and storage, it is necessary for the manufacturers to assist in conserving space wherever possible, and therefore this year they have developed various types of tiering trucks, to pile as high as 25 ft.

Another development has been a skid with a folding leg which permits the standard lift truck to get under the skid after loading; by folding the leg up after the load is lifted greater road clearance is provided and in double and triple decking, in storage, considerable headroom is saved.

The hand lift truck manufacturers have also found it necessary to enlarge the scope of their trucks, in order to handle heavier and longer loads. One of the developments this year was the building of a special truck for handling assembled 20,000-lb. marine engines in one plant from the assembly department to the shipping room. The use of a self-locking ball-bearing-mounted worm operating in oil for the lifting mechanism assures dependability and ease of operation.

It has also been found that by using two hand trucks and equipping one with a turn table it is possible to take care of long loads. The forward truck, equipped with turn table, maneuvers the turns and the rear truck is controlled by an operator in the same manner as a hook and ladder truck for fire fighting, simply for steering the rear end in the same path of the forward truck.

Improvements in Conveyor Design

Conveyor manufacturers have devoted their time to advantage by bringing out better designs of bearings, gravity rollers, troughing idlers, compact drive units and the adaptation of their handling equipment to perform production operations.

One of the advantages in using materials handling equipment of the continuous type for production operations is, first, an absolutely definite line of travel; second, a mechanical control of product, time, etc., and, third, more compact units and conservation of manufacturing space.

In the overhead trolley conveyors we find a marked improvement in the construction of trolley wheels, the use of grease packed ball bearings, and new devices for continuous lubrication of chain and trolleys.

An outstanding achievement in trolley conveyor design is the use of floating drives which permits one conveyor to be propelled at different points by individual drive units. One type of floating drive utilizes a standard variable speed transmission unit to control overload while another type of floating drive uses electric motors interlocked with limit switches, relays, etc. The application of multiple drives permits longer conveyors, there being in operation at the present time conveyors in excess of a mile in length.

HANDLING methods of not so long ago.

MOVED FORWARD IN 1931

▲▲▲

Major Electric Truck Developments During 1931

Low-lift trucks:

1. Smaller, more compact
2. Shorter turning radii
3. Equipped with cranes

High-lift trucks:

1. Telescoping uprights
2. Greater lifting heights (25 ft.)
3. Smaller, more compact machines
4. Shorter turning radii
5. Hydraulic lift

Fork trucks:

1. Telescoping uprights
2. Better maneuver ability
3. Special adjustments on forks

Crane trucks:

1. Greater capacities (42,000 ft.-lb.)
2. Longer booms (30 ft.)
3. Faster hoists (150 ft. per min.)
4. Special attachments

Tractors:

1. More compact
2. Shorter turning radii
3. Automatic couplers
4. Contactor controllers

▼▼▼

Electric hoist manufacturers have created new models to make their equipment more compact, thus reducing the distance from overhead rail to load hook. They are finding new ways of making their units lighter in weight, and some have taken a step forward in developing interchangeable parts, which is a progressive move in standardization. The field of electric hoists and light monorail tracks has increased and we now find many new applications for this type of equipment.

The chain hoist manufacturers have also found it to their advantage to reduce the weight of their standard chain hoist, and one company has produced a hoist weighing at least one-third less than the old style chain hoist, as, for example, a 1½-ton capacity hoist complete with chain weighs only 38 lb. Another manufacturer is using a safety overload governor built into the hand wheel. It is set at a 50 per cent overload and sealed at the factory. If an attempt is made to lift in excess of 50 per cent overload the hand wheel will turn free and the load remain stationary. When the excess overload is reduced the hoist will function normally.

Automatic and Remote Overhead Tramrail Control

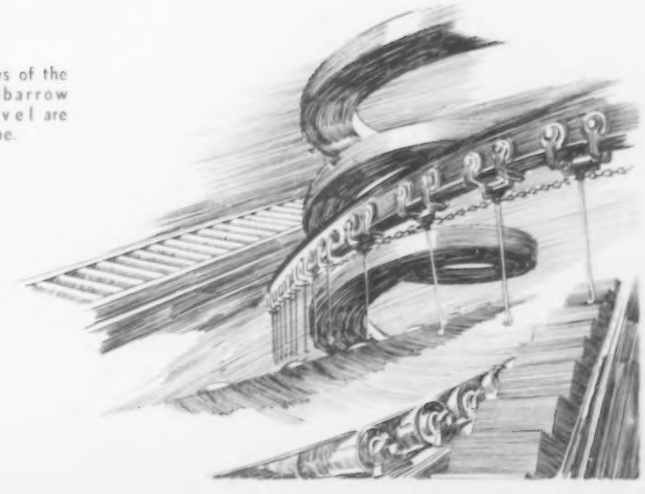
In tramrail and overhead systems we find a marked development in automatic and remote controlled units and systems. It is now possible to obtain standard switches controlled electrically either by an operator with push buttons or with electric switches which are actuated by the load passing a given point. The manufacturers of this equipment have also developed a wide variety of track hoist units so that it is possible to transport the load and elevate it between floors or automatically raise and lower it into wash, dip, or paint tanks. Most of these systems can be electric controlled so that they are practically automatic; others can be operated by manual control if desired.

One overhead manufacturer has developed a system primarily for handling mail sacks, which consists of an overhead rail, a remote controlled power propelling unit and a series of trailers which will operate at a traveling speed of 450 ft. a minute. In operation, the attendant at the loading platform puts one mail bag on each trailer, and as they pass the selector station an operator here adjusts the selector bar which is used for determining the point at which to dump the load while in transit. This selector bar controls a photo electric cell, and as the carrier passes through the unloading station, the mail bag is automatically dropped into a chute which in turn permits it to drop into the mail car. At a conveniently located position the trailer bottoms come in contact with adjusters which set the trailer for receiving a load when it again passes through the loading station.

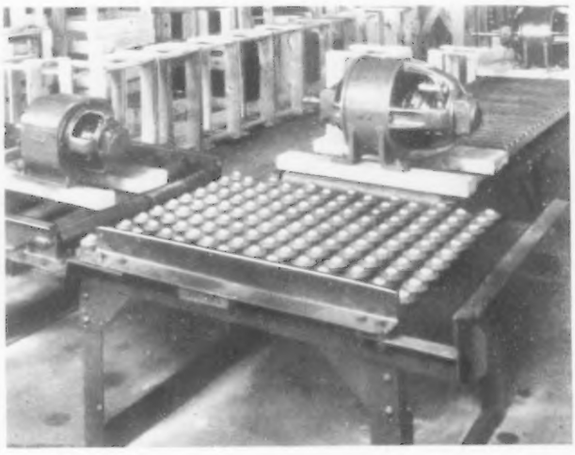
In crane manufacture we again find the trend toward compactness of design. There is also a better appreciation and provision for lubrication and mechanical maintenance. Crane builders have also done much in the past year toward a greater use of welding in the manufacture of their equipment, and even trolley hoisting machinery, end trucks and bridge

(*Concluded on advertising page* 64)

THE days of the wheelbarrow and shovel are done.



THESE WILL HELP US



THIS ingenious transfer table works in any direction. It is based upon the principle of ball bearings, the large ball which protrudes from each casing resting upon smaller balls beneath.

(*Mathews Conveyer Co.*)

▲▲▲

Improved Machinery Has Multiplied Jobs for 40 Years

▲

STEEL frame storage racks, in connection with this tiering truck form a compact and convenient storage system. The tote boxes form the storage bins as well as being part of the shop transportation system.

(*Automatic Transportation Co.*)

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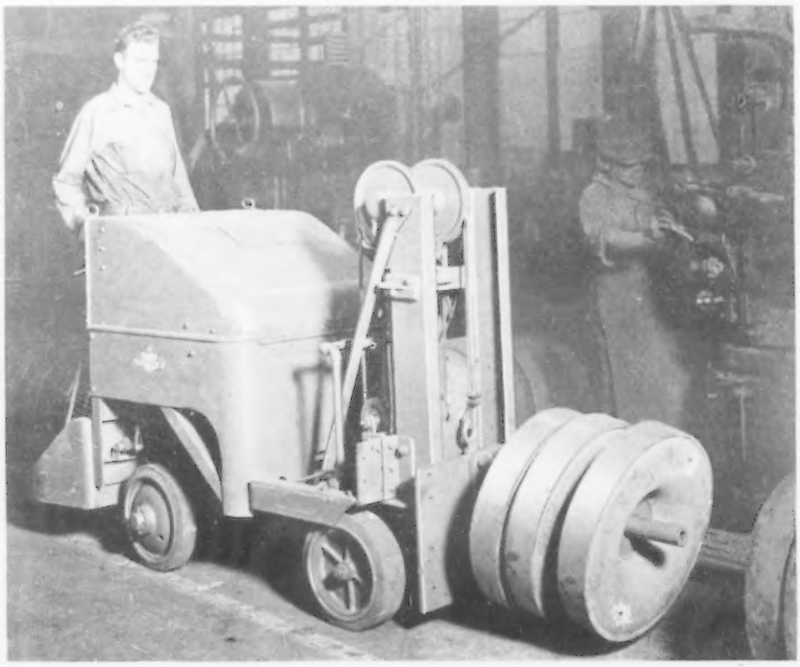
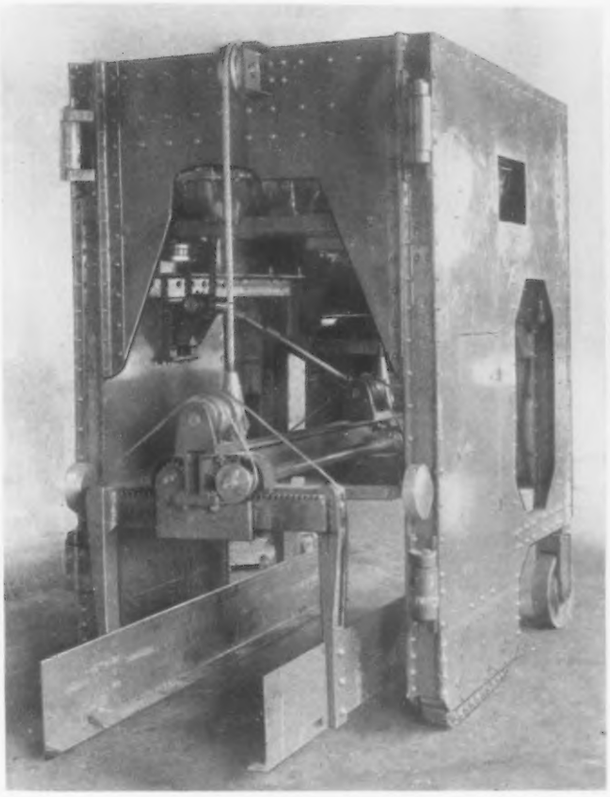


THIS "Truck-tier Ram," as it is called, is particularly useful for picking up, moving and tiering castings, wheels, spools and coils. The ram is capable of lifting a 4000-lb. load.

(*Clark Tructractor Co.*) ▲▲▲

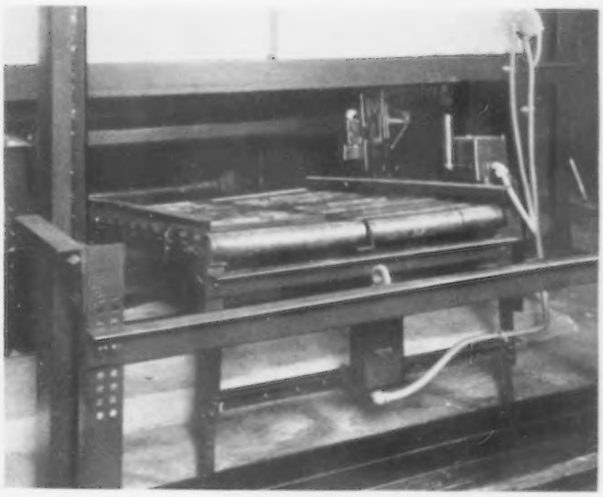
MOVE FASTER IN 1932



THIS loader, known as the "Edwards Loading Machine," is particularly useful in handling bundled material from skids. It is capable of a 10-ton lift to a height of 23 in. from floor. Note caterpillar treads.

(Signode Steel Strapping Co.)

▲ ▲ ▲



THESE electric switches control the mechanical movements of the conveyor of this automatic oven. In addition, they safeguard the handling equipment.

▲ ▲ ▲ *(General Electric Co.)*

Improved Machinery Is the Master Force of Progress

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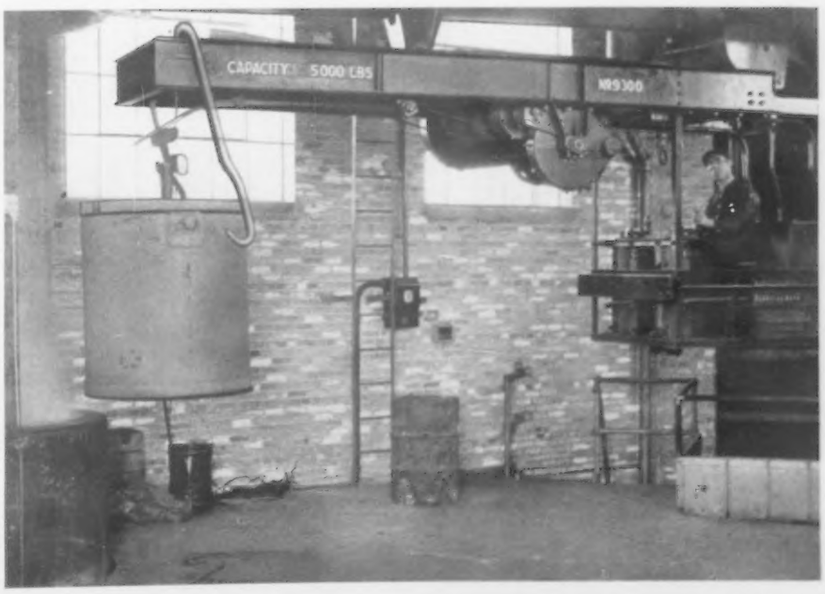
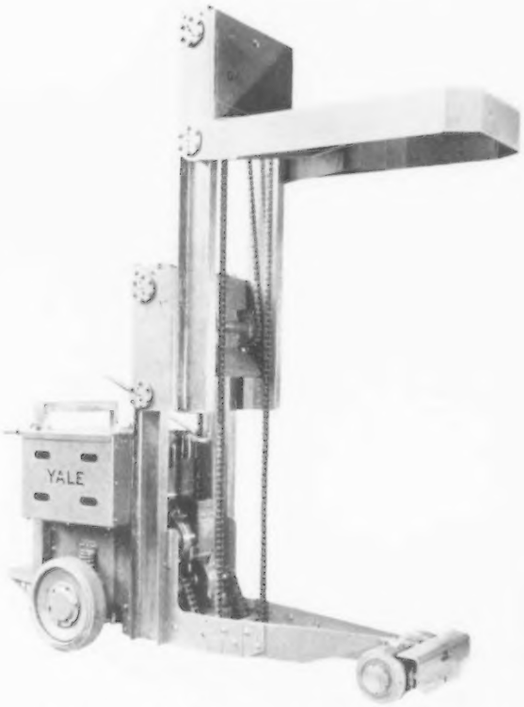


A CUPOLA charger, designed in such manner that no part of the hoist or bucket is in the cupola longer than the time required to dump the load.

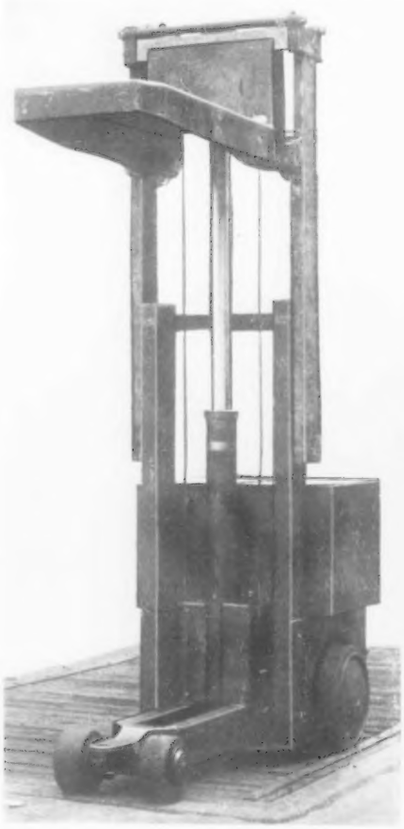
▲ ▲ *(Harnischfeger Corpn.)*

MOVING FASTER

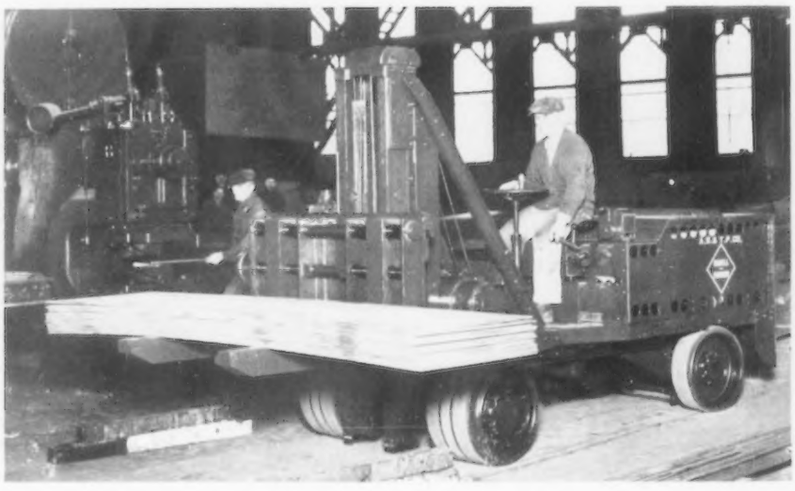
BUILT for hard work and plenty of it is this new K-48 independent chain crowd shovel of the crawler crane type.
(Link-Belt Co.)



THE multi-lift principle, as originated and applied in this tiering truck, permits the elevation of the platform to a height of 113 in., with a normal overall truck height of 83 in.
(Yale & Towne Mfg. Co.)



THIS high-lift telescopic tiering truck is hydraulically operated. It is capable of lifting the platform to a height of 113 in.
(Mercury Mfg. Co.)



THE swing toward specialized electric truck design is exemplified in this new elevating fork truck, in which forks suited to the load to be carried and lifted are easily interchanged.
(Elwell-Parker Electric Co.)

IN 1932

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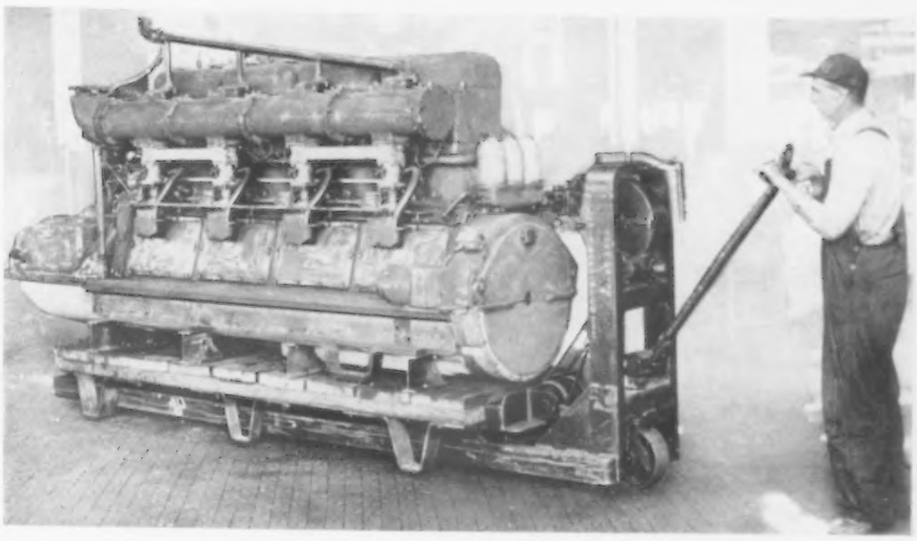


TEN tons is some lift for a hand truck, but here it is. The load on this hand truck is a 20,000 lb. marine engine.
(*Lewis-Shepard Co.*)

NOTE this skid of new design with the reversible legs. This feature saves space in double and triple tiering and permits easy handling with slings.
(*Colby-Seattle Co.*)

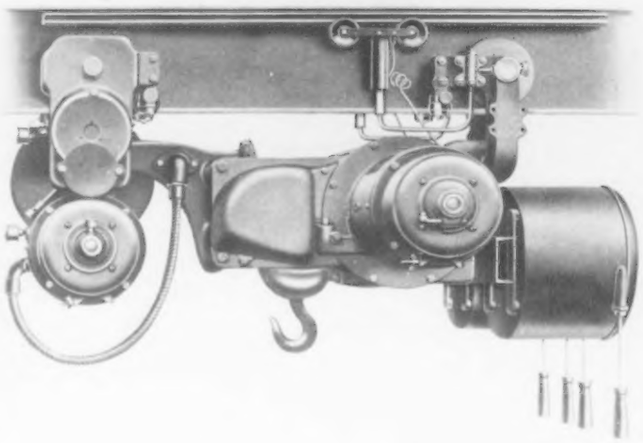
THIS telescoping, tilting fork truck handles bundles of sheet tin, copper, etc., as well as being adapted for numerous other industrial operations.
(*Yale & Towne Mfg. Co.*)

THIS chain hoist is made of Alcoa Aluminum alloy, which makes it weigh about 30 per cent less than if made of iron and steel. It has an overload governor which prevents dangerous overloading, and an adjustable load brake.
(*Chisholm-Moore Hoist Corpn.*)

MOVING FASTER IN 1932

THE photo-electric cell gets a handling job. It operates the trip for automatic discharge on this high speed overhead system. Picture shows operator, at loading station setting trip to conform with electric cell setting at discharge point.

(Cleveland Electric Tramrail Division)

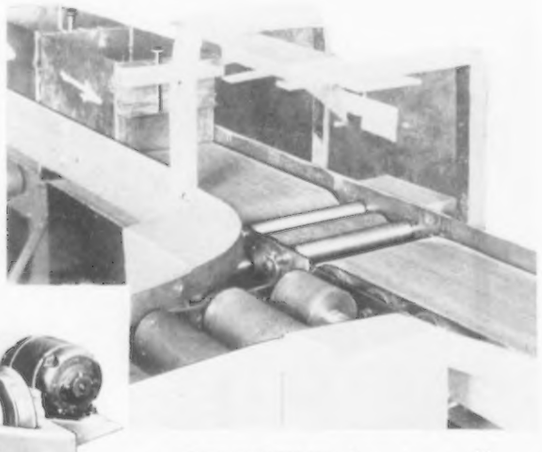


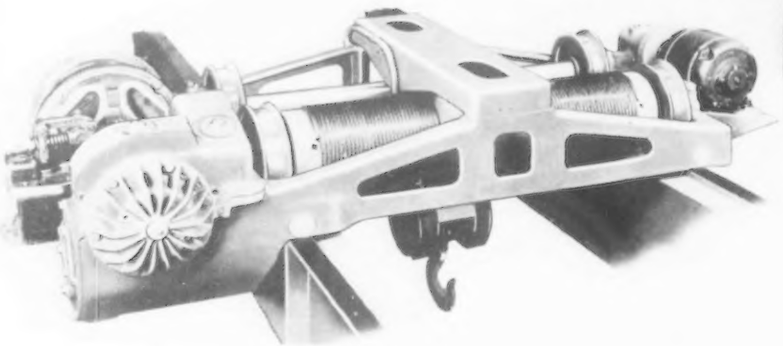
THE trend toward conservation of headroom in hoist design is well illustrated in the case of this half-ton close headroom hoist. This installation is provided with two motors.

(Shepard Niles Crane & Hoist Corpn.)

BUILT in capacities from 1 to 10 tons, the heavy-duty crane below is designed to operate in exceptionally small overall space. For example, in the ten-ton crane, the distance from hook throat to top of crane is but 36 in.

(Shaw Electric Crane Co., Inc.)



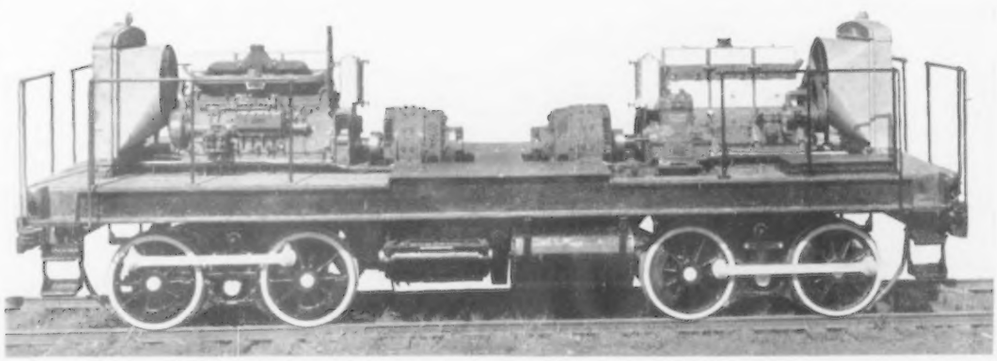


SELECTIVE diverting is illustrated in this conveyor installation. It is accomplished by means of the pin in the pan or box conveyed, which is placed in a socket corresponding to the desired station.

(Standard Conveyor Co.)

THE 60-ton 360-hp. Diesel electric yard locomotive at right is designed to develop its maximum power at switching speeds. Two Diesel engines drive two Westinghouse d.c. generators.

(Heisler Locomotive Works)



IN AT THE "FINISH" IN 1931

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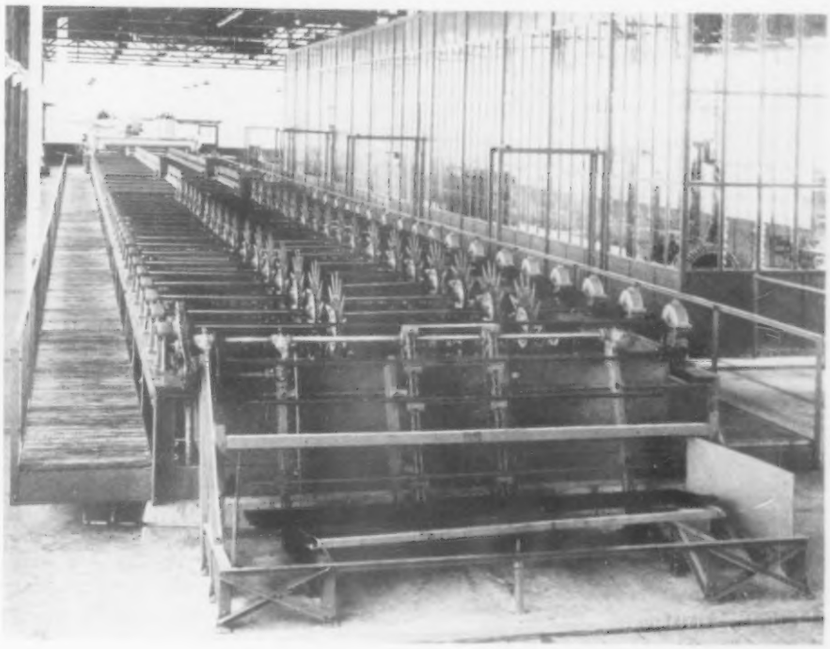
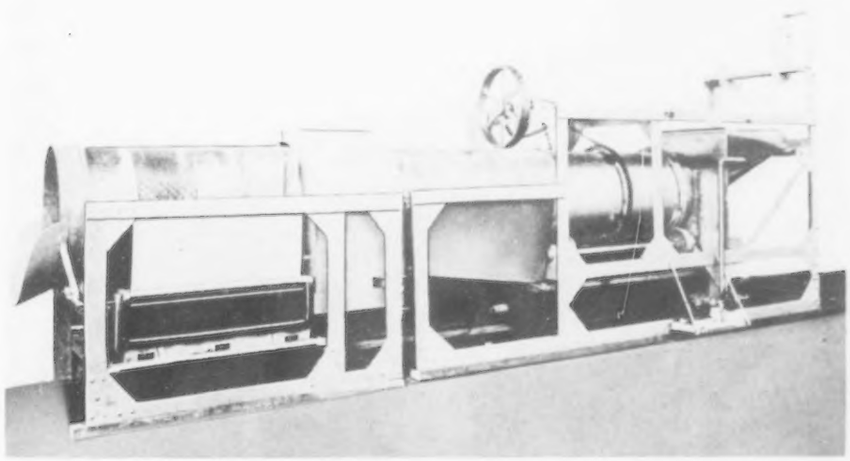
A CONTINUOUS, automatic pickling, galvanizing, enamel spraying and baking unit was installed early this year at Steel & Tubes, Inc., Warren, Ohio, a subsidiary of the Republic Steel Corpn. The builder combined 17 operations under control of a single operator. When operating at capacity, 10-ft. lengths of electric welded conduit pipe are picked up from the carrier at one end, and pickled, galvanized, enamel lined and baked as they travel through the 207 ft. of the unit, and are discharged complete at the rate of 10 a minute.

(U. S. Galvanizing & Plating Equipment Corpn.)





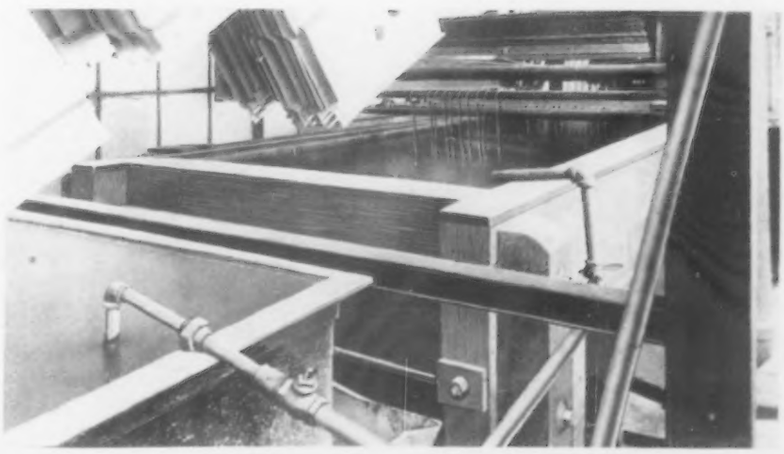
THIS rotary batch pickling unit is said by the maker to offer a relative saving of 80 per cent in labor costs, compared with still pickling of small parts. Only one operator is required for the unit and added advantages claimed are time saving and retention of work in the drum for any required period.

Parts are charged into the machine directly from tote boxes. Where flat pieces are pickled, rotation of the drum aids in more complete removal of scale.

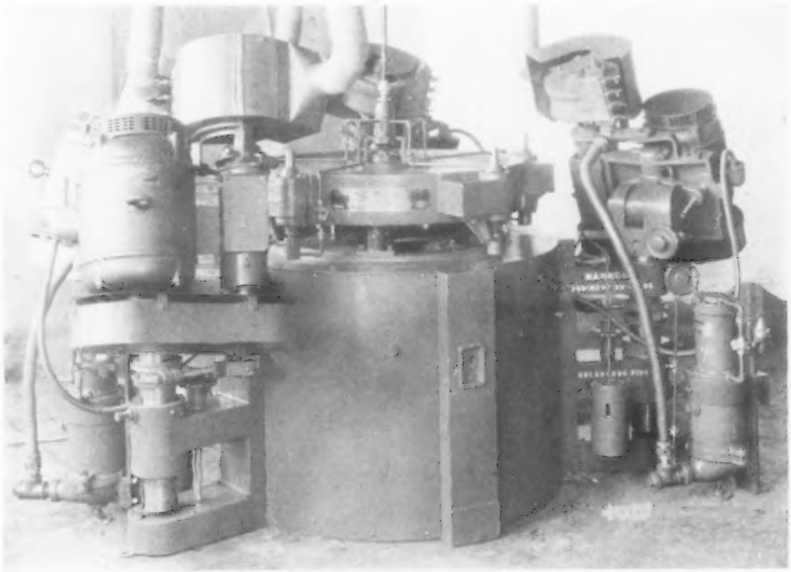
(N. Ransohoff, Inc.)

THE rubber-lined tank for plating or pickling has come into wide use in recent years. In many cases, users have operated with rubber lined tanks for longer periods, with stronger acids, and at higher temperatures than recommended by the maker. A rubber-lined wood pickling tank, 21 ft. x 5 ft. and 4 ft. deep of yellow pine, lined with 5/32-in., single layer, vulcanized rubber, has been used over four years by the Detroit Vapor Stove Co. for pickling in a 35 per cent solution of muriatic acid.

(Hauser-Stander Tank Co.)



IN AT THE "FINISH"



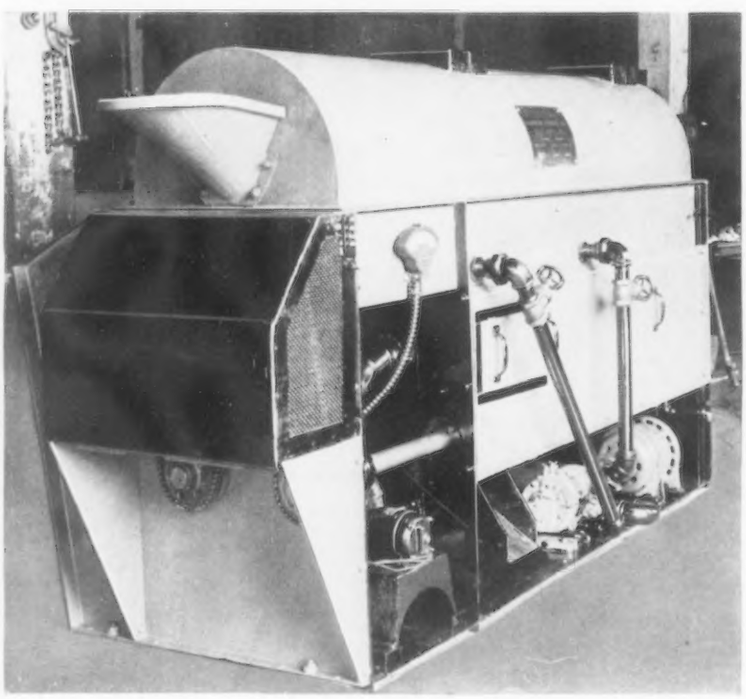
IN plants where the product is such as to require polishing a variety of shapes, or finishing comparatively small duplicate runs, a single set-up type of automatic machine does not completely serve the purpose. Flexibility of the unit is an important factor in such a plant. This general purpose universal automatic type polishing and buffing machine, furnished with four, six or seven spindles, is designed with this in view.

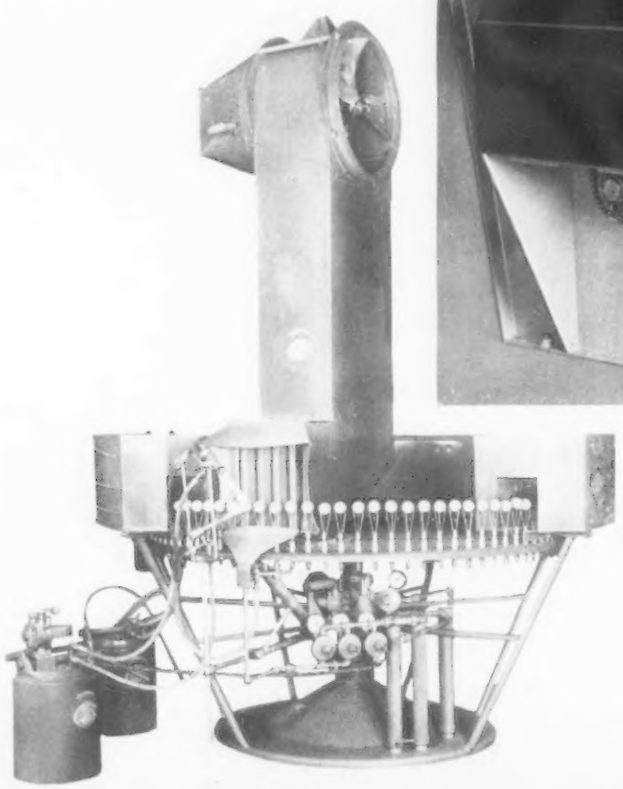
Polishing and buffing heads are completely motor-driven and speeds may be varied from 2000 to 3000, or 1800 to 2700 r.p.m.

(Hammond Machinery Builders)

THIS rotary-drum, washing and drying machine for metal parts brought a saving to a large safety-razor manufacturer of about $18,000 a year. The unit is intended for cleaning screw machine parts, stampings and small castings and will clean and dry 100 to 240 cu. ft. per 8 hr. day.

(Metalwash Machinery Co.)





THIS 90-spindle aircoating and drying unit has revolving table and spindles, which handle 90 or more pieces a minute, depending upon the speed of operation and the number of pieces, which may be placed on a single spindle. One, two or three colors may be sprayed on the work as the table revolves. Operated entirely by air pressure, it requires 20 to 30 cu. ft. of free air a minute at pressures of 5 to 70 lb.

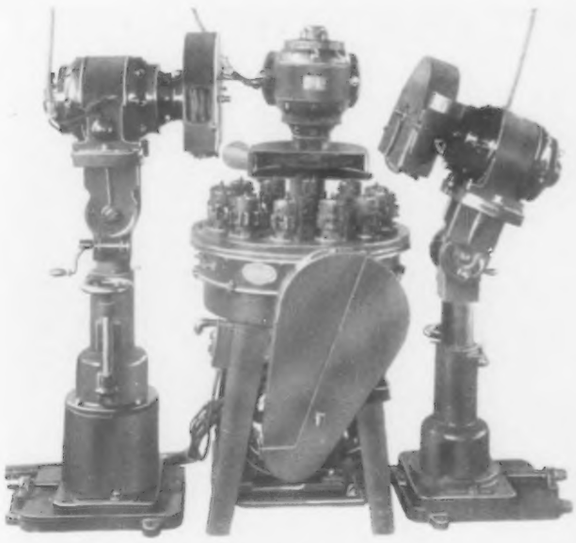
The spindles are adjustable as to size and also removable, so that a unit may be adapted to various sizes and designs of work.

(Paasche Airbrush Co.)

IN 1931

THIS centrifugal enameling unit is known as the "Filwhirl" and is intended for coating products weighing from a fraction of an ounce to several pounds. Articles are placed in the container and the coating material enters the machine through a valve. With the parts completely coated, excess coating is thrown off. Three minutes are usually required for each loading cycle, or about 20 baskets an hour. The unit requires a minimum of floor space and handles hot or cold coating. As excess coating material is drained into a floor tank, from which it may be pumped back to the supply tank, there is no waste. While the maker recommends this unit for bulk coating, certain users have developed special high-grade finishes not usual in volume production.

(Leon J. Barrett Co.)



DESIGNED to increase production, save labor and give a uniform finish, this polishing and buffing machine is recommended for finishing any metal or composition parts not exceeding 7½ in. Contact with work may be varied according to the product and the finish required.

(C. I. Packer Tool & Die Co.)

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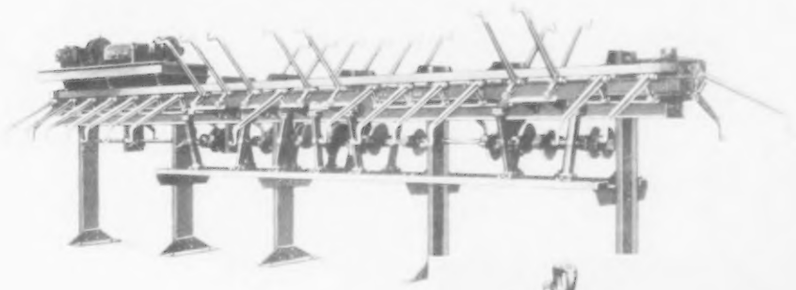
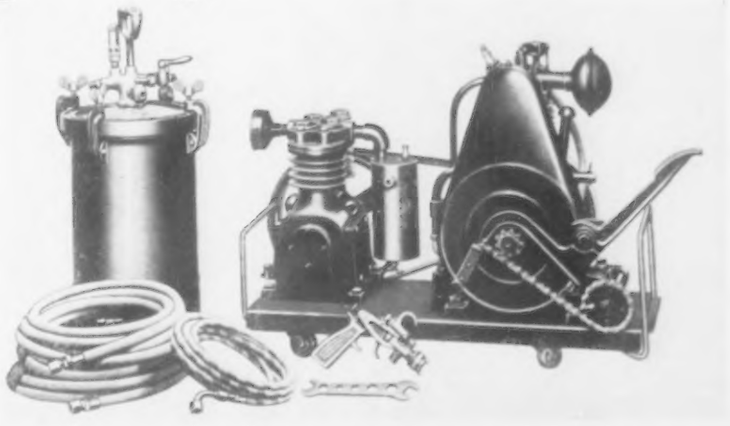
FOR spray-painting where electric current is not easily available, this light duty, gas engine driven machine, below, may be transported to the job by one person. The paint tank has a capacity of two gallons and the compression equipment is on a hand-truck.

(De Vilbiss Co.)

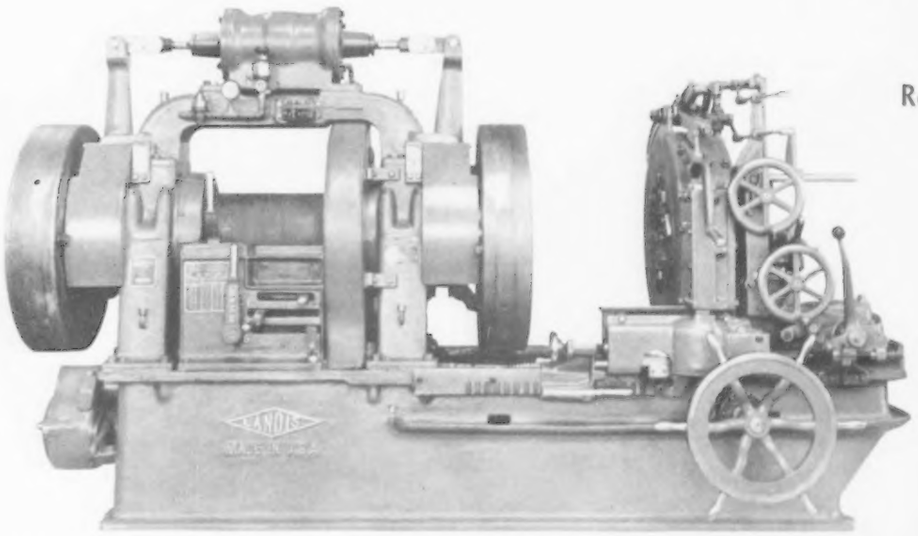


THIS portable processing conveyor, above, is sufficiently flexible to use for chromium or other plating, where time between operations is not critical and for pickling, cleaning, lacquer dipping or drying large quantities of a product. It will handle plating racks up to 30-in. long, and being mounted on a center pedestal, oil or grease fouling in the tanks is avoided.

(Meaker Co.)



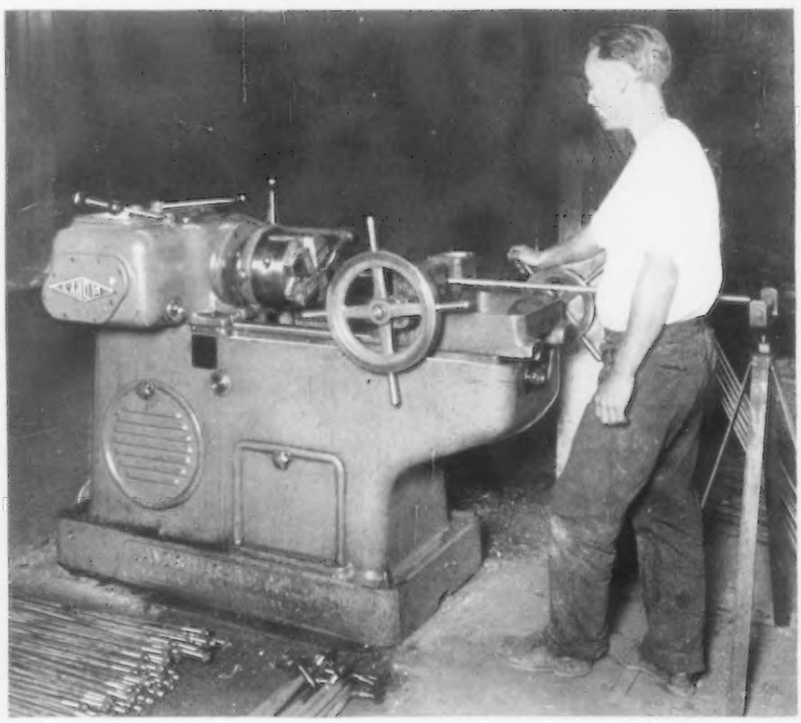
NEW BOLT AND PIPE THREADERS

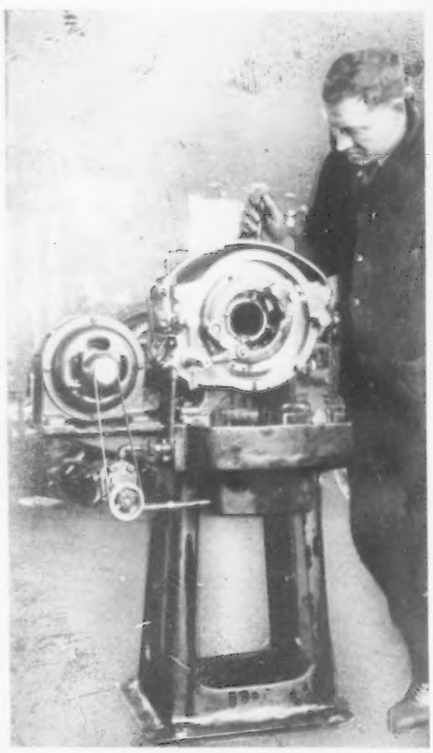


Reduced Volumes Turn the Spotlight on Unit Costs

THIS 8⅝ in. pipe threading and cutting machine was designed primarily for oil-country work, where high-carbon seamless tubing is used extensively and thread lengths are longer than usual. It is fitted with air-operated chucks and a receding chaser die head. Use of the receding chaser principle is emphasized as preventing building up of excessive cutter pressure; the leadscrew also relieves the chasers from strain.

(Landis Machine Co.)





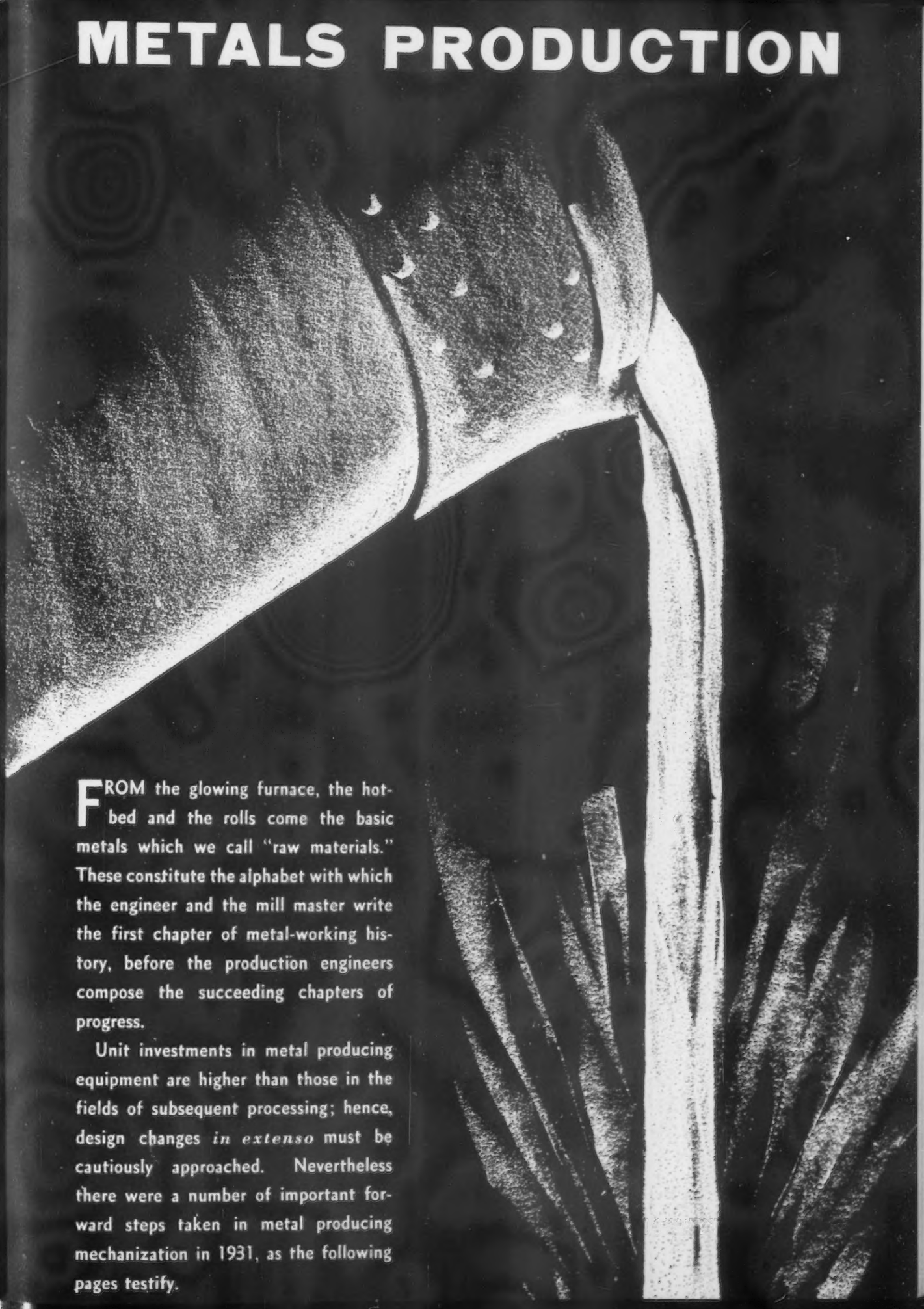
A DIRECT-CONNECTED electric 4-in. pipe cutting and threading machine (at left) has been added to the line manufactured by this company. The principle employed enables this machine to cut bends or crooked pipe, the die head riding free on the pipe without strain on threads or chasers. An automatic die release gradually withdraws chasers at end of cut. Cut off mechanism is provided.

(Curtis & Curtis Co.)

THE trend toward the use of high carbon alloy steels and the growing demand for closer screw thread limits actuated the design of this 1½ in. "Landmaco" threading machine. It is geared for approximately ten to fifteen per cent higher threading speeds than the previous machines and has approximately a 50 per cent wider speed range. While designed primarily for bolt work, it is finding extensive use on automotive parts also.

(Landis Machine Co.)

METALS PRODUCTION



FROM the glowing furnace, the hot-bed and the rolls come the basic metals which we call "raw materials." These constitute the alphabet with which the engineer and the mill master write the first chapter of metal-working history, before the production engineers compose the succeeding chapters of progress.

Unit investments in metal producing equipment are higher than those in the fields of subsequent processing; hence, design changes *in extenso* must be cautiously approached. Nevertheless there were a number of important forward steps taken in metal producing mechanization in 1931, as the following pages testify.

THE NEW IN MAKING AND

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THE stress of the year just past has left upon the steel industry the imprint of valuable lessons not soon to be forgotten and that industry must eventually emerge stronger as a "prince" for having played the role of the "pauper." The developments during such a year are not spectacular, as are those in years associated with the glory of an offensive campaign for great tonnages and large profits; rather they represent a struggle for existence, a determined and grim defensive. To learn to adapt the modern giants of productive equipment to moderate tonnages; to reduce costs through the sternest economies in production, in maintenance and in the distribution of products; to scheme to avoid obsolescence of older equipment through the application of ingenious accessories and methods; to improve the quality and exactitude of the product in meeting unprecedented requirements without suffering excessive rejections and losses—these have been the problems of the year and they have for the most part been met intelligently and courageously.

Blast Furnace Operating Intermittently

For the first time in the history of hot blast practice it has been found practicable to operate blast furnaces regularly on intermittent schedules, producing iron during eight hours each day, or otherwise regulating the output of iron, to suit the demands of the steel plant. This has been favored by the availability of accessory fuels at the hot blast stoves. Consistently good iron at reasonable cost has resulted, and these practices will often prove valuable in periods of normal business for regulating the iron supply to the fluctuations of the demand.

A great deal of study has been devoted to the character of the burden and its effect upon the working of the furnace, quality of iron and cost of production. This study has included the sizing of coke and the method of its charging. It has also included the charging of large proportions of sinter up to a full burden of sinter, following the installation of several new sintering plants.

Reductions in the amount and changes in the character of the dust carried off by the gas have been effected by variations in throat and top construction, and these are of interest in connection with the cost of gas cleaning. Certain improvements in dust catcher design are under contemplation. A unit for electrical precipitation, after washing, has been installed, and the results are being watched with much interest.

Improved types of mud gun have been found to allow the maintenance of full blast pressure at all times, and one furnace, so equipped, is reported to have been run with full wind for 26 consecutive days.

Regulation and metering of the wind on the Bessemer vessel has proved to be useful in controlling the blowing of Bessemer steel. Interest continues in extending the applications for Bessemer steel, and some work is being done in developing new Bessemer grades.

Marked Improvement in Quality

No single development in open-hearth construction or methods stands out as being representative of special progress, but definite improvement has been made due to careful attention to details in operation and maintenance and in the steel making process. That there has been a marked improvement in steel quality, generally, is beyond question, and this was, of course, forced to a certain extent by demands from the trade. Fuel economy, longer life of refractories and increased output per furnace have been effected through careful operation.

The later types of pit furnaces have been studied with reference to fuel economy and effect upon the quality of the blooms, and it has been noted that certain types in which the flame impinges downward show improved surface of blooms over the older regenerative types in which the flame is directed toward the side of the ingot. Descaling by sprays of pressure water on slabbing passes is reported to be beneficial.

Four-High Reversing Strip Mill

Important developments in rolling mill equipment have been made in connection with the production of flat rolled steel. A single-stand four-high reversing strip mill equipped with special furnaces containing reelers, one on each side of the stand, above the mill tables, in order that the strip may be kept at proper rolling temperature at all times during the rolling of the piece, has been developed and operated experimentally rolling wide strip from the slab down to thin gages (possible to No. 18 gage). Strip rolled on this mill does not require annealing preparatory to cold rolling. The mill provides ca-

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IMPROVEMENTS in steel and in its making have preceded or accompanied the successive forward steps in fabrication of metal products and improvement in machinery.

▼ ▼ ▼

ROLLING STEEL

By JOSEPH R. MILLER
Engineer and Metallurgist, Cleveland

Outstanding Among 1931's Contributions to Making Iron and Steel Are:

Intermittent operation of the blast furnace for slow-downs either every day or every week.

Furnace burdens, sometimes entirely sinter.

Electrical precipitation of furnace dust after washing.

Extended applications of Bessemer grades of steel.

Single-stand four-high reversing mill flanked by two special furnaces containing reelers to roll wide strip from the slab to thin gages.

Improved mechanization for hot black sheet mills, including continuous furnaces and mechanical handling at the rolls of the so-called conventional mill, which is accordingly given a new lease of life.

pacity calculated at 15,000 tons monthly with an investment of about one-sixth, or less, of that required for a modern continuous wide strip mill. The equipment was designed to provide a source of supply of strip for the Steckel cold strip mills on which the unannealed product of the hot strip mill can be cold rolled, without intermediate annealing, down to the thinnest gages.

The hot black sheet mills have suffered from the competition of strip sheet as well as from the conditions prevailing during the last two years in the sheet steel market. In order to reduce the production costs on hot black sheet and tin mills and to preserve this equipment from obsolescence, a combination of accessory devices has been developed and is in operation on a number of mills. By means of these devices the pairs as well as the packs or sheets are mechanically passed through the operations of heating and rolling, doubling, etc., each movement being under electrical control operated by the rollers and helpers, the feeding of the pairs only being manually accomplished. Installation of these devices on a sufficient number of mills will doubtless defer for some time the replacement of further tonnage of sheet by additional capacity for strip sheet.

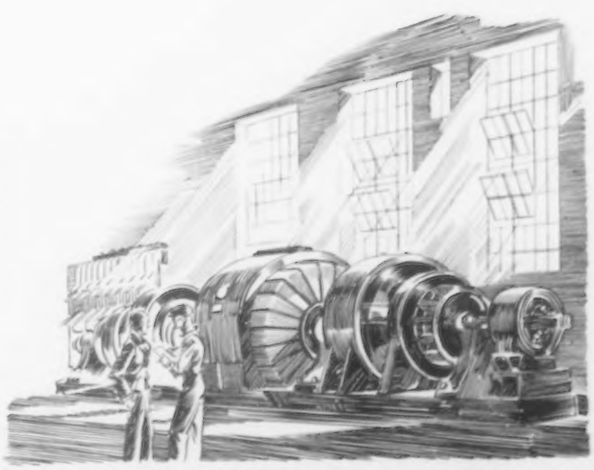
As a development from the slitting and edging devices applied heretofore to pipe forming machinery, there has been designed plate mill shearing equipment with tables, manipulating devices, etc., all under electrical control, which is contemplated for shearing to width, or slitting to narrow widths, and edging to extremely close width tolerances with square or beveled, plain or upset edges as required in sheared plate or in skelp plate for welded pipe. This equipment is under consideration for two important plate mills at the present time, and besides its advantage for preparing skelp plate it promises greatly to reduce the cost of shearing plate mill product.

Intermittent running of a blast furnace, herein referred to, is now being practiced at a number of plants. In some cases it is a daily stopping and starting and in others a week-end slowing up. As yet no serious difficulties have been encountered, epoch-making as the procedure is.

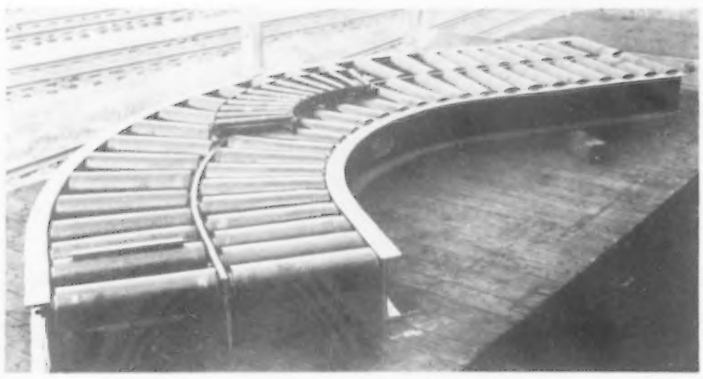
The success indicated is regarded in part as owing to the greatly improved lines of modern blast furnaces and also to the uniformity of the raw materials and, not the least, a better understanding of blast-furnace operations. If any damage is being done to the furnace linings, either in the way of their being eroded or in the way of their building up and whether or not the practice is calculated to shorten the life of the lining brick, the test of time will tell.

It is safe to say that there is surprise that these intermittent operations are as satisfactory as they apparently are. They stand as an example of what the force of necessity has compelled the iron makers to do. And it may prove a very salutary result of the depression.

STEEL production both serves and is served by the major mechanical products of industry. Power, as exemplified by power producing equipment, is a good example of this.



THE MARCH IN HOT METAL

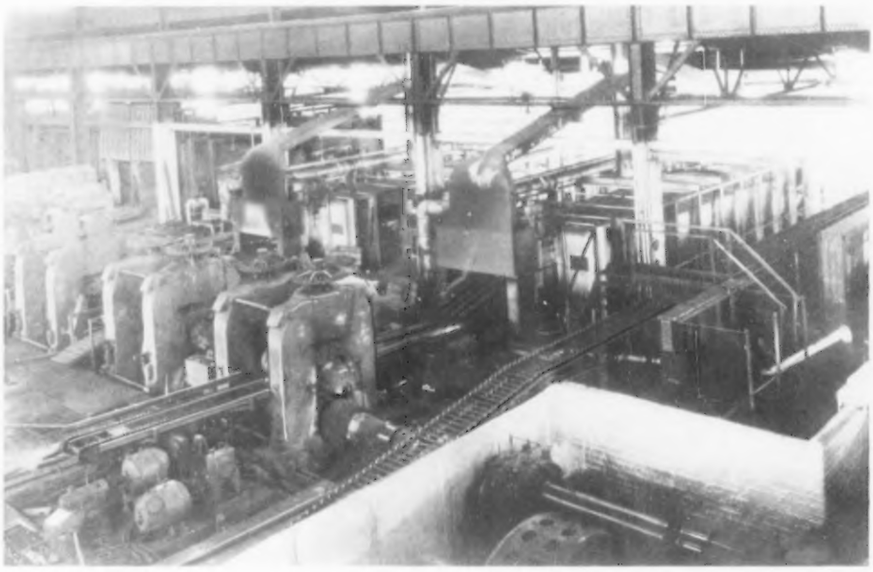


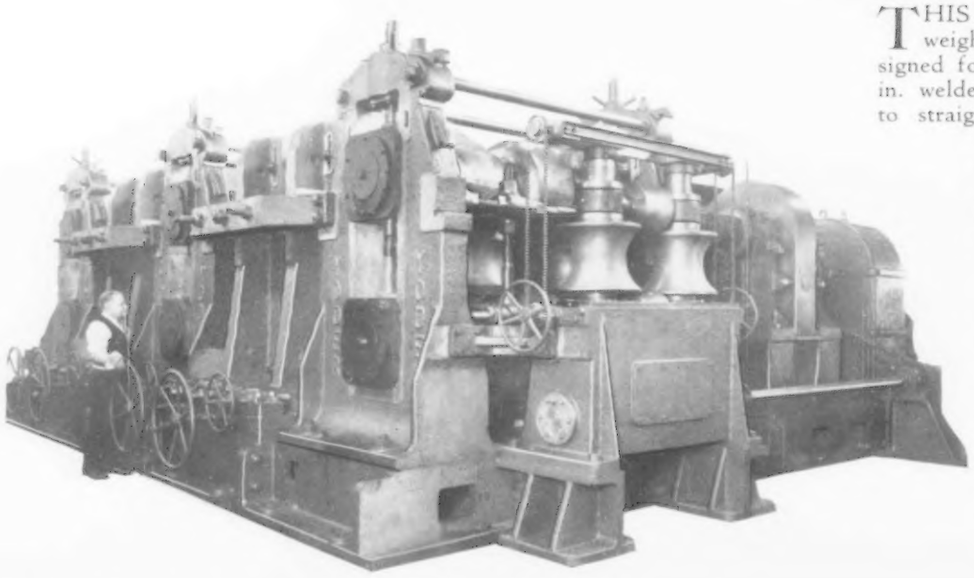
THIS heavy-duty 90-deg. curve in a roller conveyor line is said to be the largest yet built. It is of three-roll construction, with rollers of grease-packed type. It is used to convey coils of hot strip steel on end from one pallet conveyor to another at right angles thereto. Each coil, weighing 3 tons, is 40 in. in diameter and 66 in. high. The curve has a 6-ft. center-line radius. The rollers are 20¼ in. long and about 5½ in. in diameter, made of seamless tubing with ¾-in. wall. Each roller can carry 8000 lb.

(Mathews Conveyer Co.)

THIS example of modernization of the conventional sheet and tin mill, one of 26 mechanized installations of the year, with its total of about 200 continuous furnaces, includes mechanical feeding and catching apparatus. Tonnages as high as 34 tons of No. 27 gage 28 in. width material in 8 hr. have been produced on one mill equipped in this manner, the material being heated twice, run over through the mill, re-heated and finished on the same mill.

(Wean Engineering Co., Inc.)



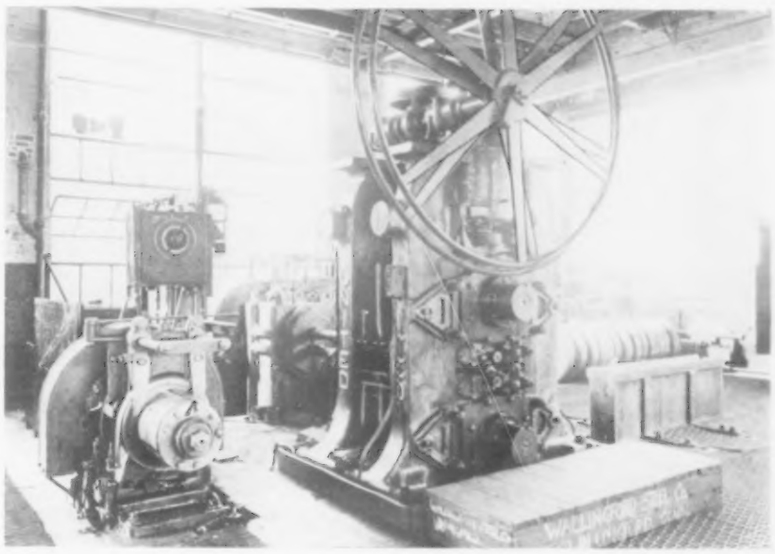


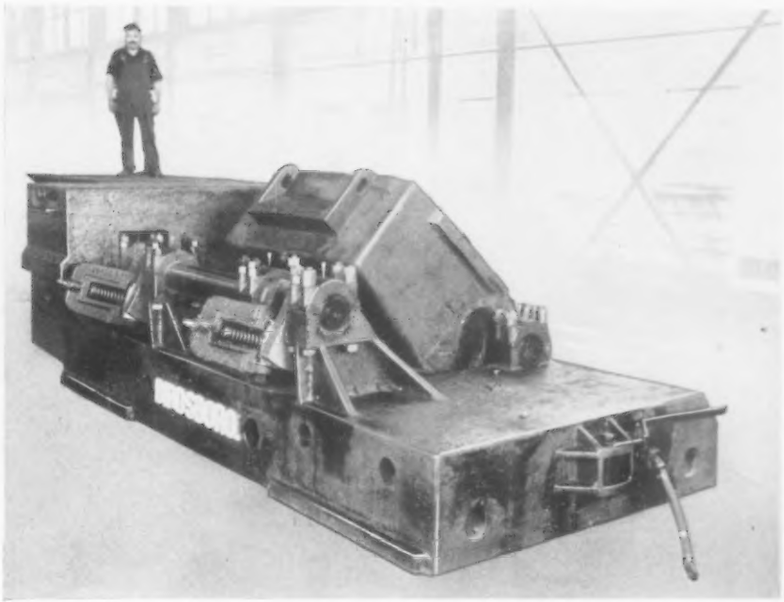
THIS massive machine, weighing 450 tons, is designed for reducing 16 to 26 in. welded pipe to size and to straighten it, through a series of nine stands of rolls, each stand being a cluster of two vertical and two horizontal rolls. The rolls shown in foreground are merely guide rolls through which the pipe is passed into the machine. Then come three sizing stands, followed by four straightening stands and one final stand also for straightening.

(Yoder Co.)

MECHANIZATION

Inferior Equipment Can "Get By" in Easy Times





STANDARD equipment in small cold-rolling plants has come to the use of four-high mills such as shown above. This one, for rolling strip steel, has backing-up rolls very heavy with relation to their length This design doubles the output of the two-high mill, saves power and gives better control of gage.

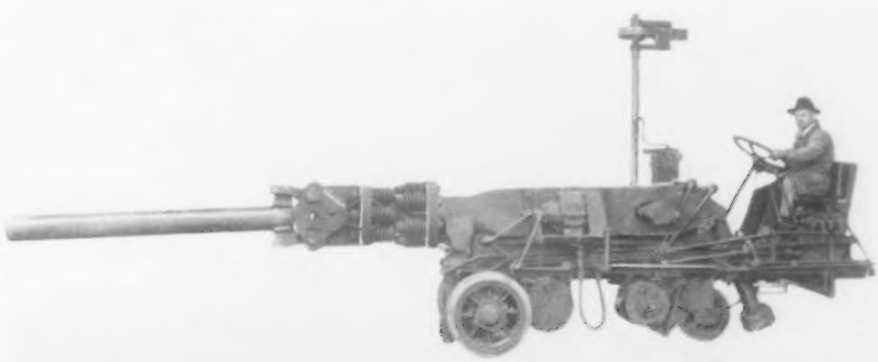
(United Engineering & Foundry Co.)

THIS self-tilting buggy for delivering ingots from soaking pit to blooming mill is of exceptionally heavy construction, designed to handle ingots up to 50,000 lb. It operates on standard-gage track. All working parts are protected against shock.

(Birdsboro Steel Foundry & Machine Co.)

AN automobile-type manipulator for forgings is shown at right handling an axle blank weighing 1600 lb. It is operated from the seat, and can function over any good floor, requiring no track or overhead runway. The articulate peel has two sets of shock-absorbing springs, protecting the machine from the hammer blow.

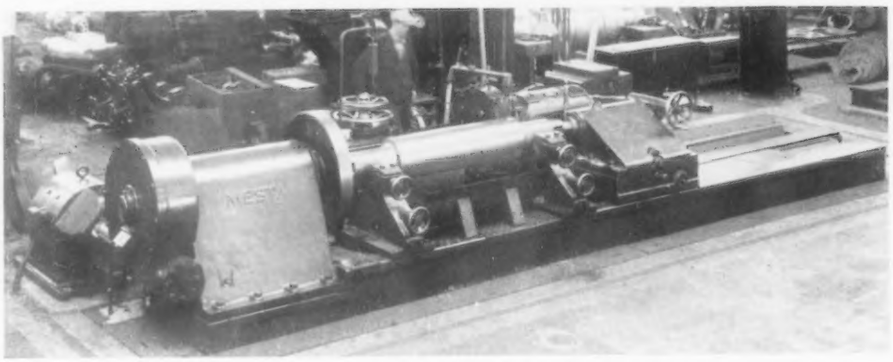
(Edgar E. Brosius)

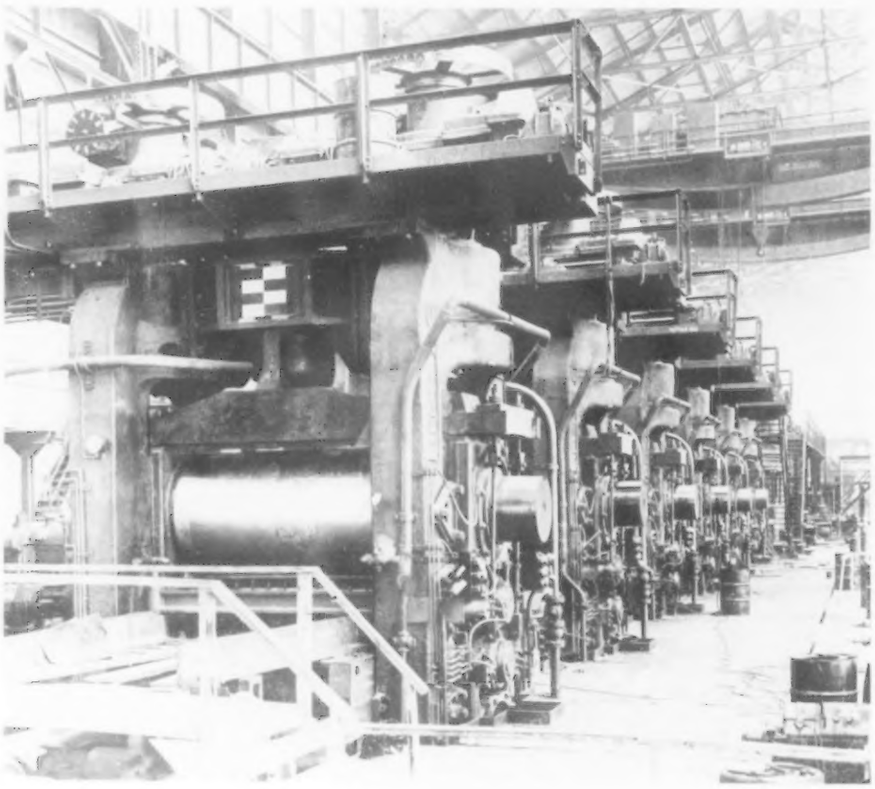


THE MARCH OF HOT METAL

DESIGNED for unusually heavy work and close tolerance, this automatic roll grinder can take a roll weighing as much as 100,000 lb. and with maximum dimensions of 53 in. diameter and 20 ft. long. Much gearing was done away with through mounting the grinding wheel on the armature spindle.

(Mesta Machine Co.)





THIS mill is designed to roll steel plates continuously up to 92 in. wide and 140 ft. long. Delivery speed is 350 to 700 ft. a minute. Said to be the heaviest plate mill in the world, the total length from soaking pits to finishing end is 2100 ft. The mill is driven by motors aggregating 30,000 hp. The two roughing stand gears are more than 21 ft. in diameter, with teeth 6 ft. long. A finished plate can be rolled in one heat from the ingot, or the slabs may be reheated midway of the process.

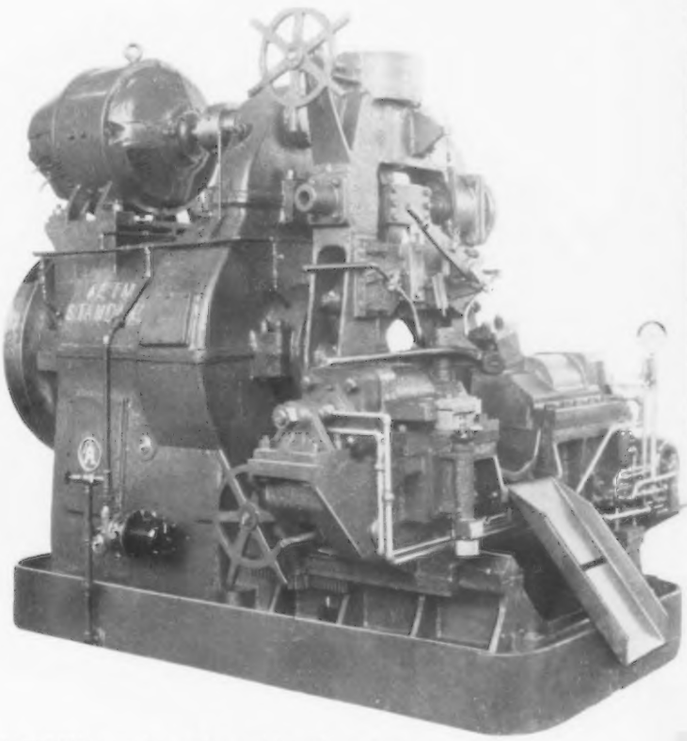
(United Engineering & Foundry Co.)

FOURTEEN large rectangular bell-type furnaces were installed by a large manufacturer for annealing large flat steel sheets electrically. The results showed economical operation, uniform annealing, saving of floor space and improved appearance.

(Westinghouse Electric & Mfg. Co.)

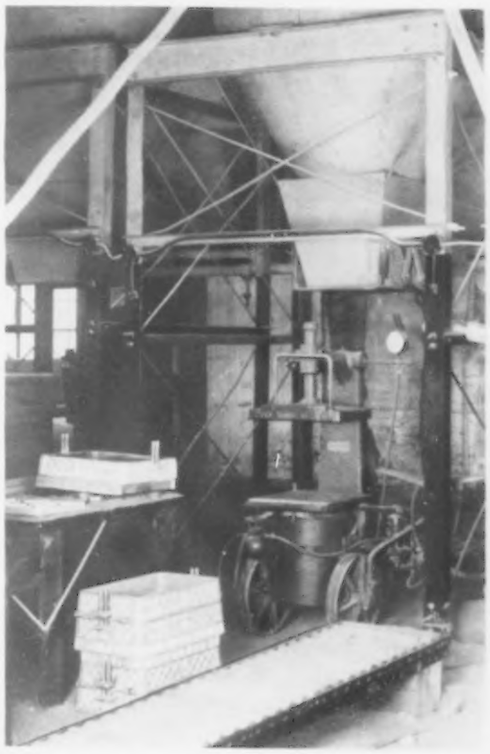
MECHANIZATION

Prosperity Is Built Through Progressive Mechanization



THIS cutting-off machine for pipe and tubes from 6⅜ to 16 in. outside diameter has cutting tools fed by hydraulic pressure from a pump. The pump with its driving motor is mounted on the tool carriage. Tubes are held in a five-jaw chuck mounted on the entering end of the spindle, instead of the cutting-tool end. Rounding-up blocks or clamps just back of the cutting tools hold the tube rigidly. Internal moving parts are lubricated by a spray oil system.

(Aetna-Standard Engineering Co.)



THESE two cantilever jar squeezers have been installed with an overhead hopper system and a small roller installation to receive the completed molds. The cantilever type of molding machine is designed to give the operator easy access at the front and both sides.

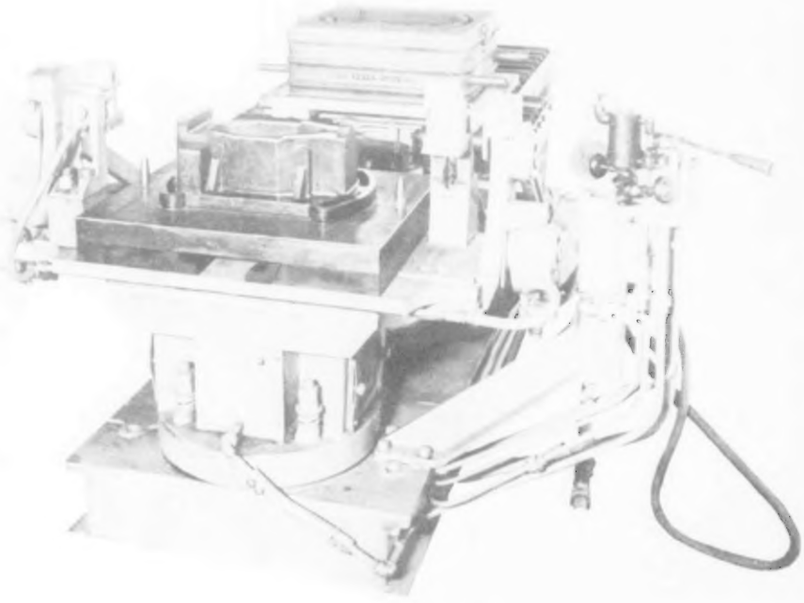
(Tabor Mfg. Co.)

THIS automatic two-way conveyor switch was designed for handling hot sheet packs. It receives packs from both sides of a continuous furnace and delivers them automatically to the mill, in accurate alinement with the rolls. Pivoted switch sections are arranged to raise or lower automatically.

(Mathews Conveyer Co.)

THE MARCH OF HOT METAL MECHANIZATION

To Compete Tomorrow, Prepare for Cost Reduction Today

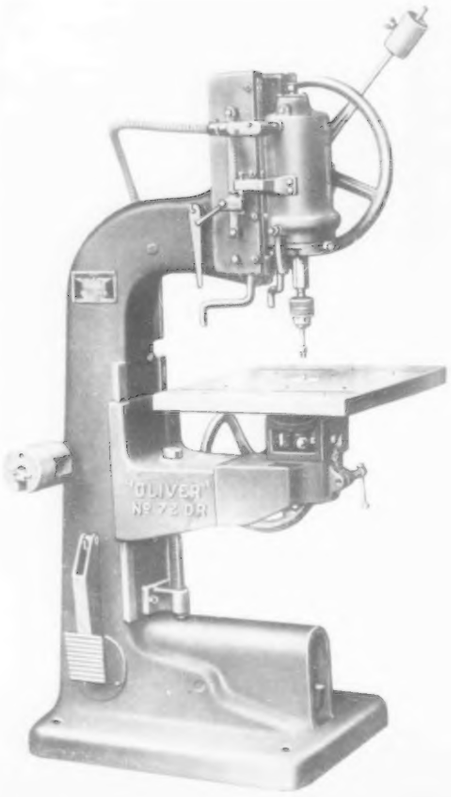


THIS 750-lb. capacity high speed jar roll-over and pattern drawing molding machine turns out a completed mold in less than a minute. Rolling over and drawing the pattern is oil controlled; provision is made for either fast or slow drawing. One handle of a rotary valve controls the jarring, rolling over, and pattern drawing mechanism as well as the vibrator, equalizer lock, etc.

(Herman Pneumatic Machine Co.)

FLEXIBILITY, providing adjustments for obtaining the best operating conditions for any load or type of work within its capacity is a feature of the roll-over core machine pictured in the accompanying illustration.

(Osborn Mfg. Co.)

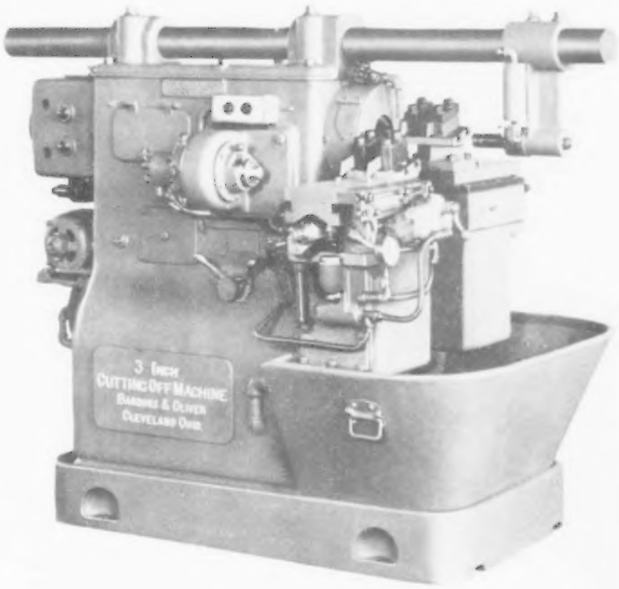


INCREASING use of free-hand routing in the pattern shop led to the development of this machine which is designed for rapid and accurate boring, milling or routing, light shaping, and recessing of small core boxes and patterns. It will bore holes up to 2-in. diameter, 6 in. deep in the center of 36-in. stock with one stroke. The motor-head type spindle runs at 3600 r.p.m.

(Oliver Machinery Co.)

PROGRESS IN CUTTING-OFF MACHINES

The Times Demand Economy; Improved Machinery Provides It

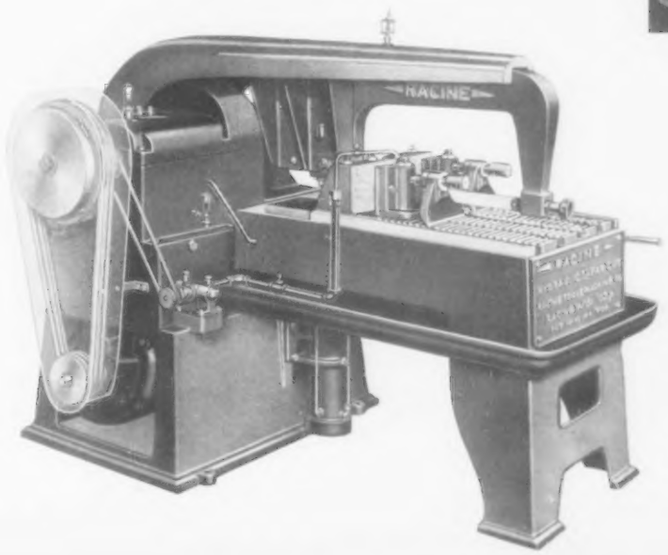


HYDRAULIC feed is embodied in this new cutting off machine which is built in both 3 and 4½ in. capacities. The machine is automatic, a single valve actuated by dogs controlling the feed, rapid traverse and rapid slide return. Two tool slides, one front and one rear, with cutting blades operating simultaneously, reduce the cutting time to one-half that of a single tool machine. Multiple tool holders are provided for each slide to permit multiple cutting of short pieces. The roller bar feed mechanism handles long or short work and the bar can be fed out 10 ft. or more if desired.

(Bardons & Oliver)

THE Campbell model 30 abrasive cut off machine was designed to cut wide stock rapidly, accurately and with an exceptionally smooth finish. Nickel silver, soft iron, hardened high speed steel and machine steel can be cut up to ¼ thick and 6 in. wide. Correspondingly wider cuts can be made on thinner stock. Will cut any material that can be cut with abrasive discs or steel saws.

(Andrew C. Campbell, Inc.)

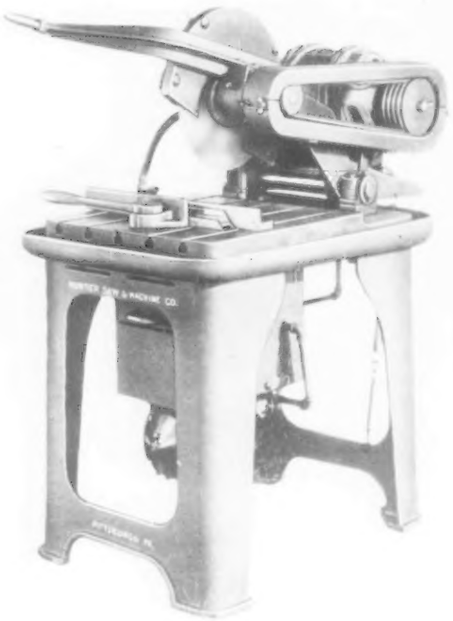


FEED, lift, clutch and rapid traverse are hydraulically operated and controlled by means of a single lever at the front of this power saw designed for high speed operation. Reports of tests indicate the practicability of cutting through a 9-in. bar of mild steel in 13 to 20 min., and, in general, a cutting rate up to 5 sq. in. a min., depending on the class of metal. A geared head gives cutting speeds of 55, 85 and 120 strokes a min.; length of stroke is 6 in. A Racine pump furnishes the hydraulic pressure.

(Racine Tool & Machine Co.

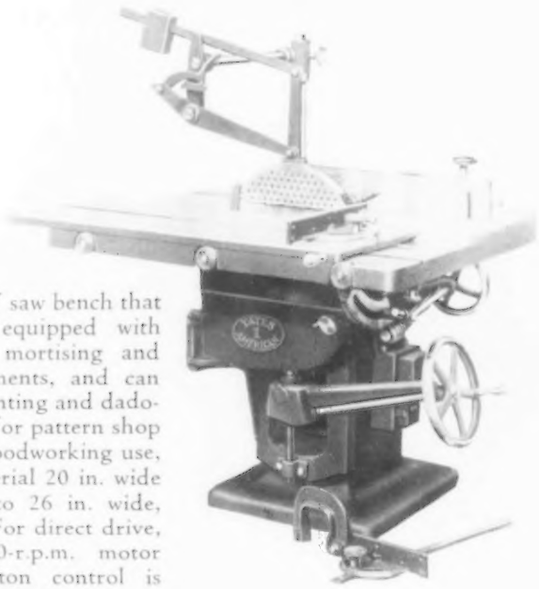
NEW AIDS TO

Economic Battles Are Fought and Won with Machinery



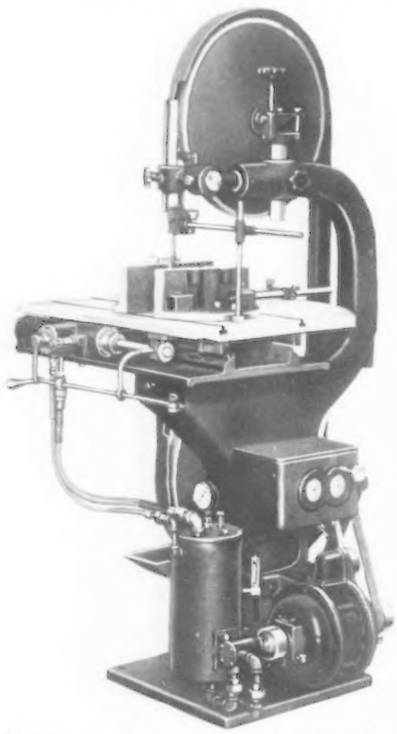
MOTOR and saw arbor of this cutting-off saw for light section tubes and shapes are mounted on opposite ends of a balanced swing frame; the saw blade is pulled through the work by an offside hand lever. Saw blades from 10 to 18-in. diameter can be used.

(Hunter Saw & Machine Co.)



A VARIETY saw bench that can be equipped with sliding table, mortising and boring attachments, and can be used for jointing and dadoing. Suitable for pattern shop and general woodworking use, it will rip material 20 in. wide and cuts off to 26 in. wide, 2¾ in. thick. For direct drive, a 5-hp., 3600-r.p.m. motor with push-button control is furnished

(Yates-American Machine Co.)

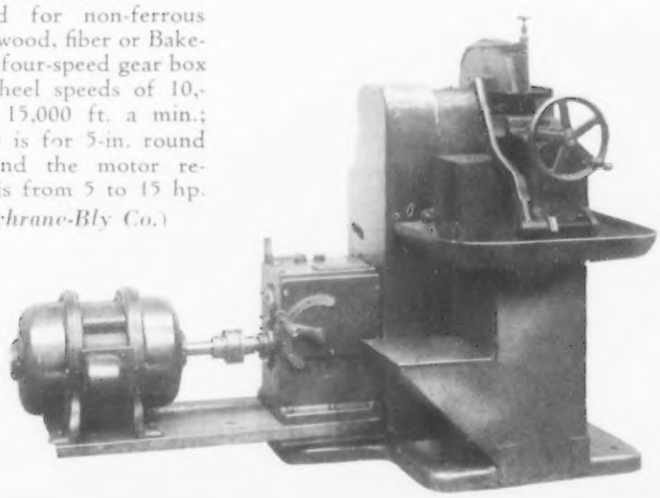


WHILE primarily intended for use in tool rooms, laboratories, and for variety cutting in metal working shops, this new hydraulic feed metal cutting band saw is also well adapted to production work. It is normally built with 8 speed changes.

(William Laidlaw, Inc.)

THIS abrasive wheel cut-off machine is designed for either wet or dry cutting and a saw blade can be used for non-ferrous metals, wood, fiber or Bakelite. A four-speed gear box gives wheel speeds of 10,000 to 15,000 ft. a min.; capacity is for 5-in. round stock and the motor required is from 5 to 15 hp.

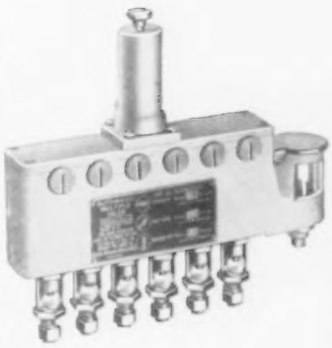
(Cochrane-Bly Co.)



PRODUCTION AND PROFITS

IMPROVED features of this gear burnisher include hydraulic operation, and centerline burnishing pressure, the latter eliminating any cocking tendency on the part of the master burnisher. An automatic burnishing cycle is provided, permitting, however, a variation in the length of the contact in each direction and variable pressure control.

(City Machine & Tool Works)



THE gravity feed automatic multiple oiler shown in the accompanying illustration delivers controlled amounts of oil varying from ¼ to 10 drops to each bearing regardless of the viscosity of the oil so long as it will flow through passages never less than 3/16 in. These definite quantities of lubricant are released at predetermined intervals by means of pneumatic mechanism, solenoid, electric motor, link connection to the machine being lubricated, or by hand.

(Gits Bros. Mfg. Co.)

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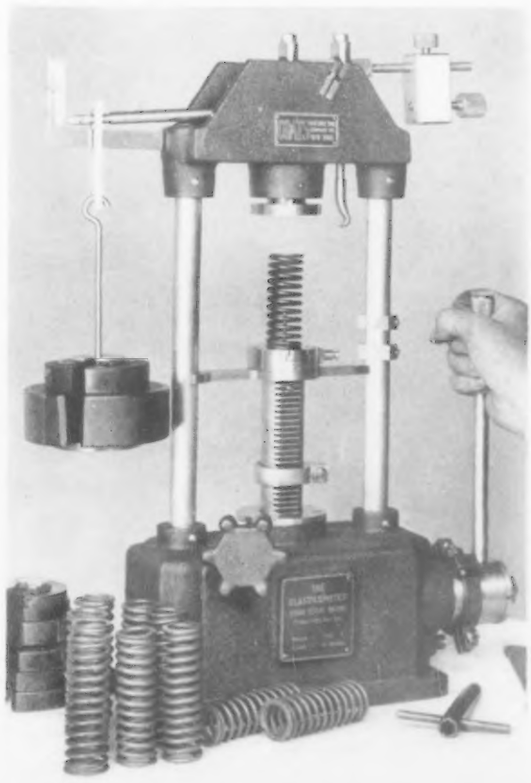

ACCURATE tests of compression or tension springs can be made with the Elasticometer which indicates not only the amount of force applied to the spring but also its exact length when under the required tension or compression. The model illustrated is adapted for the inspection of motor valve springs and tension springs of comparative size.

(Coats Machine Tool Co.)

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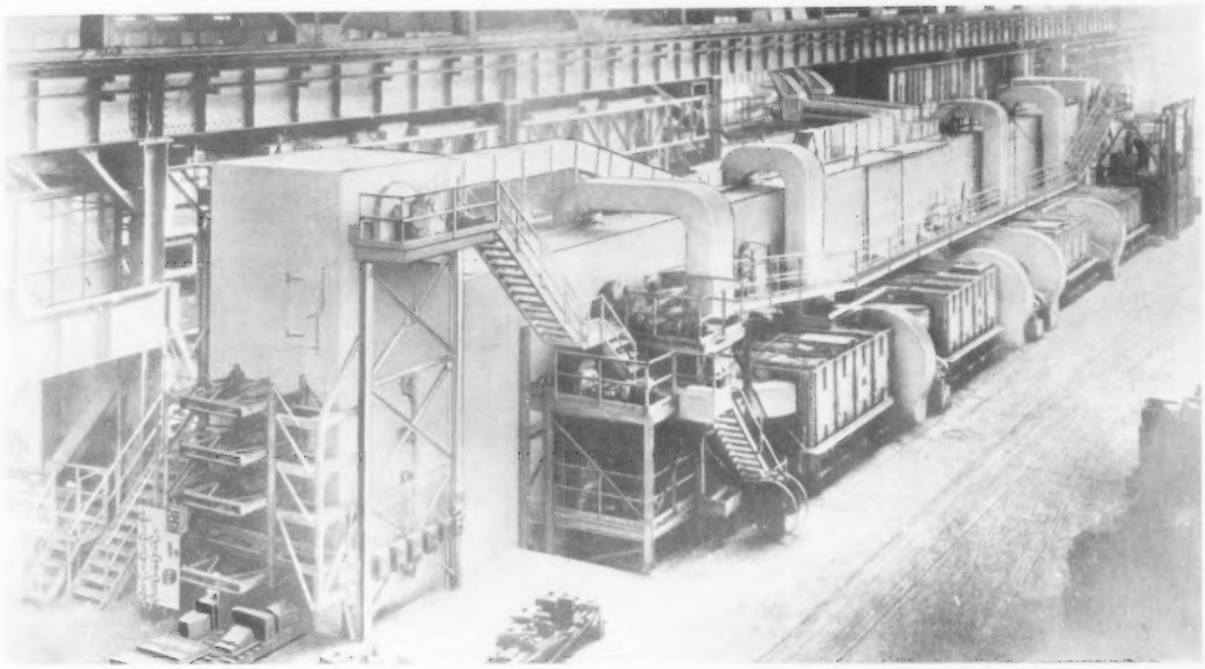

THE picture reproduced above taken at the plant of the General Steel Castings Corpn., shows a new continuous core oven of the roller conveyor type said to be the largest ever built. It is 235 ft. long and contains five tiers or passes for cores of various sizes. The core plates are propelled through the oven by a pusher mechanism. Hot gases from four outside oil-fired heaters are recirculated to save fuel.

(Foundry Equipment Co.)

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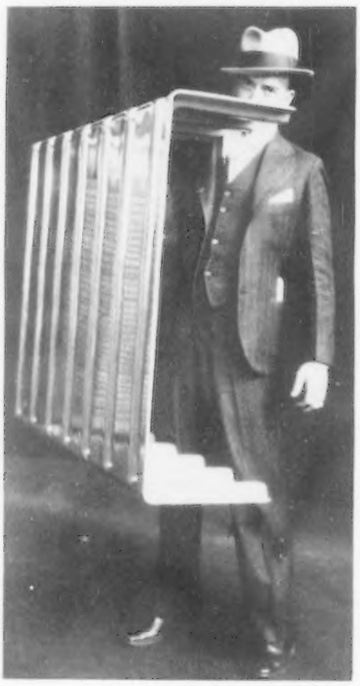
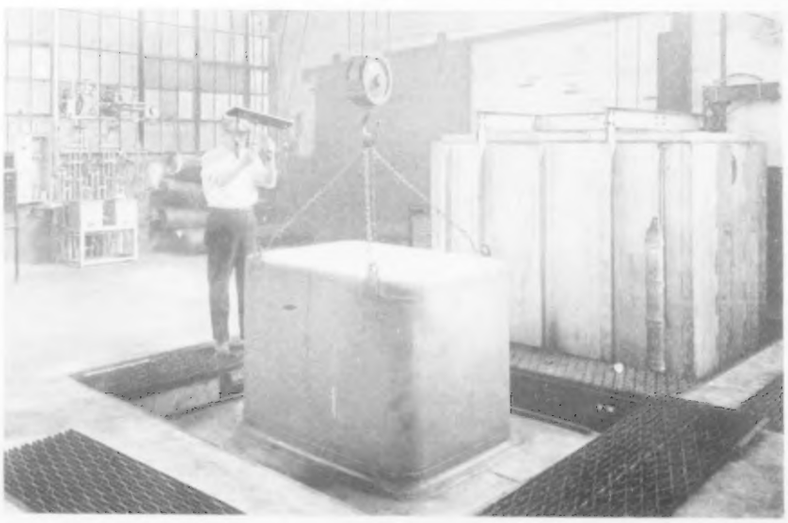


THIS is a rectangular type of nitriding furnace, developed to use a chamber formed by an inner hood over the base and a larger outer hood over the charge. The seal is made entirely outside of the furnace. The hoods are made of a welded heat-resisting and nitriding-resisting alloy and all corners are made with large radii to relieve heating strains.

▲ ▲ ▲ *(Westinghouse Electric & Mfg. Co.)*



LIGHT weight is combined with strength in this new aluminum alloy pressed skid platform. Capable of holding five tons weight, and follows the design of the pressed steel skid platforms built by the same company.

(Youngstown Pressed Steel Co.)

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Better Machinery Is the Best Builder of Employment

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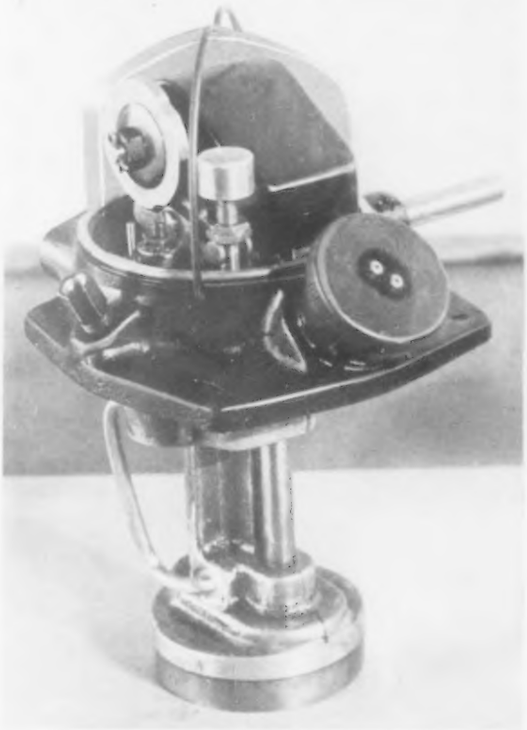
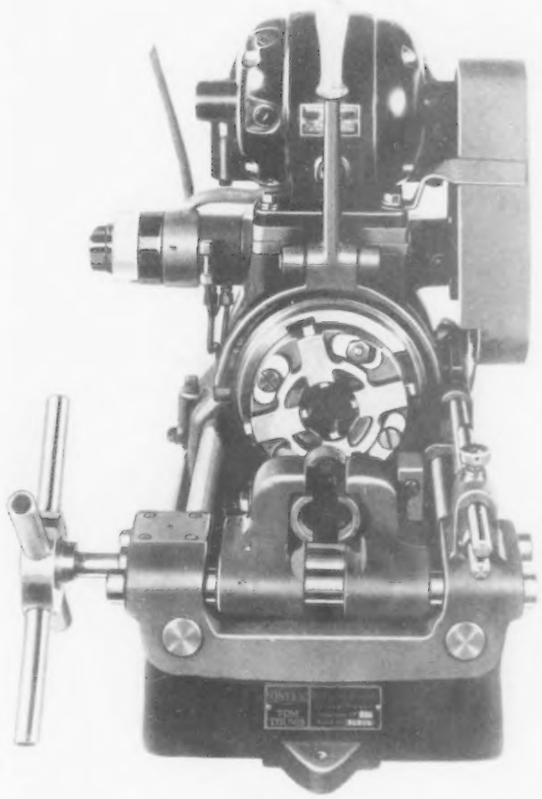


FOR positive and accurate lubrication of any number of bearings on a machine tool, this automatic oiler is equipped with a small gear pump and timing mechanism that delivers oil to the bearings at predetermined intervals. A by-pass returns oil to the reservoir except when the timing cam actuates a valve which allows lubricant to be forced to the bearings. Regulation of oil as required by different bearings is secured by means of metering units or drip plugs.

(Bijur Lubricating Corpn.)



THE new "Tom Thumb" pipe and bolt threading machine is made in both rotary die head and rotary spindle types. Both are self contained motor drive units, in which a maximum of compactness has been obtained without sacrifice of operating ability and convenience.

(Oster Mfg. Co.)

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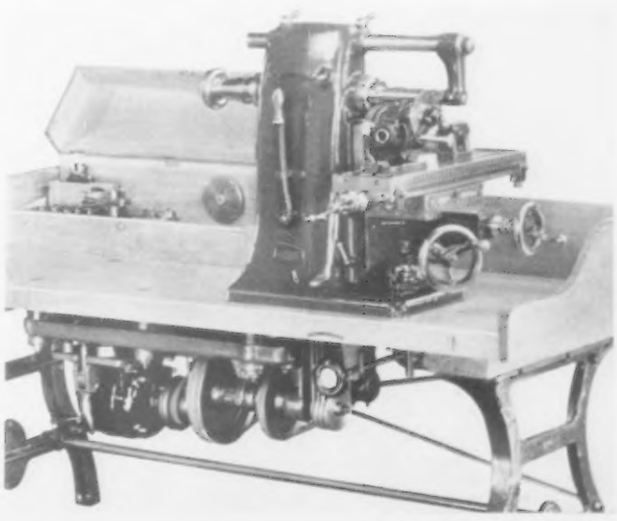

THIS Cataract bench miller, for toolroom work and sensitive precision milling, is arranged with motor and V-belt drive. The lever at the headstock actuates a clutch in the transmission for high, stop and low, and with the three-step motor pulley, six speeds are obtainable. The six reverse speeds are controlled by handwheel.

(Hardinge Brothers, Inc.)

Modernizing Goes Apace in Stamping Trade

(*Concluded from page 75*)

equipped with transfer feeds. The material is first introduced by roll feeds, magazine feeds or friction dial feeds.

Four-point suspension presses built with two overhead double-crank shafts were introduced to the trade by the Marquette Tool & Mfg. Co. and have since been taken up by other press builders. These machines represent one of the most radical departures in press design of recent years. For some of the large-area, light-gage operations of the automobile trade they offer a relatively compact machine with the advantage of four power applications at or beyond the four corners of the die and more or less independent of any unbalance in the layout of the operation. Some remarkably high die life figures have been reported for these machines. One man, prominent in the automobile trade, has expressed the opinion that the four-crank press would supersede the double crank type to a considerable extent.

Another novel piece of stamping equipment is the new type of long stroke reducing press designed by Charles R. Gabriel, E. W. Bliss Co. In this machine he places the twin driving gears inside between the side housings of the press with a crankpin between them near the rim. The result is a length of stroke which torsional strains would make impossible with an ordinary crankshaft. For brass the drawing speeds have been stepped up to exceed 170 ft. a minute with perfectly smooth and satisfactory action.

Welded steel plate press construction has attracted some attention by its novelty. Inability to distribute the metal to maximum efficiency, softness of structure after the final anneal, and the human factor in trying to tie heavy sections by welding may prove insurmountable obstacles. The greater stiffness of steel over cast iron, weight for weight, is offset by the higher fabricated cost of the steel even in reduced weights and less efficient sections. If weave in the fabricated sections and the other objections can be overcome, there will obviously be desirable savings in patterns and pattern storage. Experimental work will continue and may in time develop some satisfactory applications.

In the field of press accessories, some distinct trends are observable. V-belt drives from motor to flywheel, shown in the first of the accompanying pictures, are being used more generally, probably because their flexibility eases the unavoidable shocks of the intermittent power demand. Electro-magnetic controls for the brakes and the multiple disk clutches of the larger presses have been developed to satisfactory operation with attractive points in convenience and safety.

A combination of two mechanical clutches on the larger presses has attracted some attention. A high-speed rolling key clutch on the crank shaft gives fast operation and an incidental saving in power, while a friction clutch on the back shaft gives convenient hand control for die setting. For press forging and certain sizing and coiling operations, hydraulic overload relief beds with air controlled pop-valves have had a favorable reception. Such beds give a quick relief at an easily adjustable point and permit the use of faster lighter presses on dangerous operations.

Automatic lubrication, especially for the larger and the faster presses, has been conceded as desirable, but differences of opinion still exist as to the perfect method of obtaining it. The slow down stroke and quick return press drive still promises much in speeding up the drawing of steel.

The conclusion would seem to be that the modernization movement in the stamping trade has shaped itself distinctly toward more highly specialized and higher priced units designed to increase speeds and tool life and to reduce handling of parts and storage space. Many little refinements are available to make press equipments yield more than they ever yielded before.

▲ ▲ ▲

Precision Grinding in 1931 and 1932

(*Concluded from page 49*)

of the operators, of personal injury. Hopper feeds, hydraulic and pneumatic work-loading devices by their increased use and improved methods of functioning, are doing probably more than anything else to eliminate this fear, by making for increased safety. Better guarding of dangerous elements, automatic lubrication of all mechanisms and greater strength and rigidity in the tools are all factors playing an important part in this line of improvement.

Trend of the Immediate Future

While it is not possible to forecast with any accuracy the developments which the economic stress of 1932 and onward will bring forth, it is perfectly safe to say that much future progress will be made along the lines of development mentioned in this article. Improvement in methods of inspection are occurring daily, and not the least significant of these is the coupling up of the inspection bench and the machine performing the final operation, in such a way that the inspector exercises control over the size functions of the machine and maintains the work within the prescribed tolerances.

The grinding machine and grinding wheel manufacturers have always played an important part in the establishment of sound economics in any precise manufacturing scheme, and it is safe to say that they have a lively sense of responsibility regarding the demands which will be made on them in the future.

With the growth of the movement in favor of more accurate drawing, forging and other hot and cold metal forming processes, there will be, concurrent with a decreased number of metal removing operations by other processes, a simultaneous increase in the number and extent of the precision grinding operations.

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Steel Production Improves Slowly; New Business Is Still Meager

Operating Rate at 24 Per Cent—Illinois Steel Co. Announces 1.70c. on Plates, Shapes, Bars—Freight Rates Cause Confusion

STEEL ingot production has recovered slightly from the low point of the last two weeks of December, now being estimated at 24 per cent. In the corresponding week of 1931 the rate was 41 per cent.

The Pittsburgh and Chicago districts are only at 20 per cent, but Cleveland continues at 32 per cent, the Wheeling rate has risen sharply to 40 per cent and the Birmingham district, aided by the resumption of the Ensley rail mill, is at 50 per cent. A minor improvement has occurred in eastern Pennsylvania.

Year-end orders for January shipment were meager, steel companies having accumulated scarcely any backlogs. An unsettled price situation, coupled with discouraging fundamental conditions, has contributed in no small measure to hesitancy among steel consumers and distributers in placing January replenishment orders.

NOTWITHSTANDING the slow start of the new year, it is expected that steel operations will continue to gain moderately during January, with the possibility that February will reflect the usual seasonal rise more than this month.

Automobile and farm machinery manufacturers are increasing their schedules gradually and men are being called back to railroad shops for repair work, while industry generally has existed so long on a starvation basis that some buying for stock is held to be a possibility if price declines are checked.

Whether price strengthening can be brought about in advance of a gain in volume of business remains to be seen, but Chicago mills are making a move in that direction, having taken a firm stand for 1.70c. a lb. on plates, shapes and bars, a $2 a ton increase over prices that have recently represented sales in that district. The Illinois Steel Co. on Tuesday announced the higher price, following like action by the Inland Steel Co. last week. Sheet makers have also stiffened their quotations on some grades in that territory.

Meanwhile, further concessions of $2 a ton on automobile body sheets have been made, and cold-rolled strip steel and fender stock have weakened at Pittsburgh and Cleveland.

Pig iron production figures for December add emphasis to what is already known of the sharp curtailment in activity last month. The daily average of 31,625 tons and the month's total of 980,376 tons make new low records for the past 10 years. Excepting July and August, 1921, the daily output was the smallest since November, 1900.

Furnaces in blast on Jan. 1 were 56, a net loss of 11 from the 67 in service at the beginning of December. The year-end figure is by far the lowest of this century and probably below that of any time since the summer of 1894. The 56 furnaces active on Jan. 1 were making iron at a rate of 29,365 tons a day, compared with 35,810 tons on Dec. 1. Several furnaces that were banked last month are, however, scheduled to resume production shortly.

DECEMBER output of automobiles in the United States and Canada was about 110,000 units, a gain of about 40,000 over that of November. A further increase to between 125,000 and 150,000 is indicated for January, with the first quarter estimated at 500,000 to 550,000 units, against 697,449 in the corresponding period last year. Ford is not expected to attain volume production of the new eight-cylinder model until February.

Building construction, as reflected by structural steel lettings, is at the between-seasons low point. Only 6000 tons was awarded in the week, and new inquiries were negligible. Considerable work, however, is pending on which action is expected soon, as, for example, 22,000 tons at Chicago.

STEEL companies will make formal protest to the railroads regarding the new freight rates effective Jan. 4. Confusion has resulted from the advances on finished steel, which produce unwieldy fractions sometimes running into four decimals, such, for example, as the rate from Bethlehem, Pa., to New York, which becomes 1.6775c. a lb. On pig iron the rate was fixed at 12c. a net ton, whereas that commodity is sold in gross tons, making the charge 13.44c. a ton on that basis. The Ohio Railway Commission has already ruled that 12c. a gross ton shall apply on intrastate shipments, and an effort will be made toward the adoption of the same ruling on interstate movements.

A further objection of the steel companies is on the iron ore rate, which originally was $3 maximum per car, but on request of the carriers was changed by the Interstate Commerce Commission to 6c. a net ton. As the average ore shipment is 65 gross tons, the increase that will be levied is a great deal more than was contemplated in the original decision of the commission.

Heavy melting steel scrap has made another all-time low, THE IRON AGE composite price having declined to $8.47 from $8.50 a week ago.

▲▲▲ A Comparison of Prices ▲▲▲

Market Prices at Date, and One Week, One Month and One Year Previous, Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron

Per Gross Ton:	Jan. 5, 1932	Dec. 29, 1931	Dec. 8, 1931	Jan. 6, 1931
No. 2 fdy., Philadelphia	**$15.64**	$15.51	$15.51	$17.76
No. 2, Valley furnace	15.50	15.50	16.00	17.00
No. 2 Southern, Cin'ti	**14.82**	14.69	14.69	14.19
No. 2, Birmingham	12.00	12.00	12.00	14.00
No. 2 foundry, Chicago*	16.50	16.50	17.00	17.50
Basic, del'd eastern Pa.	16.25	16.25	16.25	17.75
Basic, Valley furnace	15.00	15.00	15.00	17.00
Valley Bessemer, del'd P'gh.	**17.89**	17.76	18.26	19.26
Malleable, Chicago*	16.50	16.50	17.00	17.50
Malleable, Valley	16.00	16.00	16.50	17.50
L. S. charcoal, Chicago	**23.17**	23.04	23.04	27.04
Ferromanganese, seab'd carlots †	†75.00	†75.00	†75.00	80.00

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

†Ferromanganese quotations adjusted to carload unit; larger quantities at discount.

Rails, Billets, etc.,

Per Gross Ton:				
Rails, heavy, at mill	$43.00	$43.00	$43.00	$43.00
Light rails at mill	34.00	34.00	34.00	36.00
Rerolling billets, Pittsburgh	28.00	28.00	29.00	30.00
Sheet bars, Pittsburgh	28.00	28.00	**29.00**	**30.00**
Slabs, Pittsburgh	28.00	28.00	29.00	30.00
Forging billets, Pittsburgh	35.00	35.00	35.00	36.00
Wire rods, Pittsburgh	37.00	37.00	35.00	35.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.50	1.50	1.60	1.60

Finished Steel

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.50	1.50	1.60	1.60
Bars, Chicago	1.60	1.60	1.60	1.70
Bars, Cleveland	1.55	1.55	1.65	1.65
Bars, New York	**1.85**	1.83	1.93	1.93
Tank plates, Pittsburgh	1.50	1.50	1.55	1.60
Tank plates, Chicago	1.60	1.60	1.60	1.70
Tank plates, New York	**1.798**	1.78	1.83	1.88
Structural shapes, Pittsburgh	1.50	1.50	1.50	1.60
Structural shapes, Chicago	1.60	1.60	1.60	1.70
Structural shapes, New York	**1.768**	1.75¼	1.80¼	1.85½
Cold-finished bars, Pittsburgh	2.00	2.00	2.10	2.00
Hot-rolled strips, Pittsburgh	1.45	1.45	1.50	1.55
Cold-rolled strips, Pittsburgh	1.95	2.00	2.05	2.25

Finished Steel

Per Lb. to Large Buyers:	Jan. 5, 1932 Cents	Dec. 29, 1931 Cents	Dec. 8, 1931 Cents	Jan. 6, 1931 Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh	2.25	2.25	2.40	2.35
Hot-rolled annealed sheets, No. 24, Chicago dist. mill	**2.40**	2.35	2.50	2.45
Sheets, galv., No. 24, P'gh	2.80	2.80	2.90	2.90
Sheets, galv., No. 24, Chicago dist. mill	2.90	2.90	3.00	3.00
Hot-rolled sheets, No. 10, P'gh	1.60	1.60	1.70	...
Hot-rolled sheets, No. 10, Chicago dist. mill	**1.75**	1.70	1.80	...
Wire nails, Pittsburgh	1.95	1.95	1.90	1.90
Wire nails, Chicago dist. mill	2.00	2.00	1.95	1.95
Plain wire, Pittsburgh	2.20	2.20	2.20	2.20
Plain wire, Chicago dist. mill	2.25	2.25	2.25	2.25
Barbed wire, galv., Pittsburgh	2.60	2.60	2.55	2.55
Barbed wire, galv., Chicago dist. mill	2.65	2.65	2.60	2.60
Tin plate, 100 lb. box, P'gh	$4.75	$4.75	$4.75	$5.00

Old Material

Per Gross Ton:				
Heavy melting steel, P'gh	*$10.12½*	$10.25	$10.25	$13.25
Heavy melting steel, Phila.	7.50	7.50	7.75	10.50
Heavy melting steel, Ch'go	7.75	7.75	7.75	10.25
Carwheels, Chicago	8.50	8.50	8.50	11.25
Carwheels, Philadelphia	11.50	11.50	11.50	14.00
No. 1 cast, Pittsburgh	10.00	10.00	10.00	12.50
No. 1 cast, Philadelphia	10.00	10.00	10.00	12.00
No. 1 cast, Ch'go (net ton)	8.50	8.50	8.50	9.50
No. 1 RR. wrot., Phila.	9.50	9.50	9.50	13.50
No. 1 RR. wrot., Ch'go (net)	6.50	6.50	6.50	8.50

Coke, Connellsville,

Per Net Ton at Oven:				
Furnace coke, prompt	$2.25	$2.25	$2.40	$2.50
Foundry coke, prompt	3.50	3.50	3.50	3.50

Metals,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York	7.37½	7.37½	6.87½	10.62½
Electrolytic copper, refinery	7.00	7.00	6.25	10.25
Tin (Straits), New York	*20.75*	21.80	20.65	26.62½
Zinc, East St. Louis	*3.12½*	3.15	3.17½	4.10
Zinc, New York	*3.47½*	3.50	3.52½	4.45
Lead, St. Louis	3.55	3.55	3.65	4.80
Lead, New York	3.75	3.75	3.85	5.00
Antimony (Asiatic), N. Y.	6.15	6.15	6.25	7.30

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

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▲▲▲ The Iron Age Composite Prices ▲▲▲

	Finished Steel	Pig Iron	Steel Scrap
Jan. 4, 1932	2.052c. a Lb.	$14.79 a Gross Ton	$8.47 a Gross Ton
One week ago	2.052c.	14.79	8.50
One month ago	2.095c.	14.96	8.58
One year ago	2.121c.	15.90	11.33
	Based on steel bars, beams, tank plates, wire, rails, black pipe and sheets. These products make 87 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel High	Finished Steel Low	Pig Iron High	Pig Iron Low	Steel Scrap High	Steel Scrap Low
1931	2.142c., Jan. 13	2.052c., Dec. 29	$15.90, Jan. 6	$14.79, Dec. 15	$11.33, Jan. 6	$8.50, Dec. 29
1930	2.362c., Jan. 7	2.121c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.412c., April 2	2.362c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.391c., Dec. 11	2.314c., Jan. 3	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927	2.453c., Jan. 4	2.293c., Oct. 25	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 11	13.08, Nov. 22
1926	2.453c., Jan. 5	2.403c., May 18	21.54, Jan. 5	19.46, July 13	17.25, Jan. 5	14.00, June 1
1925	2.560c., Jan. 6	2.396c., Aug. 18	22.50, Jan. 13	18.96, July 7	20.83, Jan. 13	15.08, May 5

Pittsburgh Mill Operations Gain Slightly But Orders Are Meager

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PITTSBURGH, Jan. 5.—Although steel production is rising gradually from the low levels reached in late December, tonnage coming to mills is still meager and consumers seem to be in no hurry to replenish their inventories. Ordinarily considerable tonnage accumulates in December for shipment in the first month of the new year, but last month was an exception and producers entered January with a minimum of aggregate releases. As a result, the prospect of materially heavier tonnage this month is growing dim, and it is believed that February will reflect the usual seasonal rise much more than January.

The smaller steel producers in this district have boosted their ingot production more rapidly than have the larger interests, and schedules this week show only a slight gain to about 20 per cent of capacity. Two of the blast furnaces banked during December are still inactive, although both will resume production shortly. In the Valleys ingot output averages about 25 per cent, the same as in the previous week. The Wheeling district is doing somewhat better at 40 per cent.

Finishing mill schedules are generally unchanged, although tin plate production has risen slightly, and nail and wire mills are busier because of releases on old low-priced contracts.

Prices are holding at about the same level as last week. The tone is weak in the principal lines, with the exception of wire products. Attempts to establish former prices on heavy hot-rolled products have met with little apparent success.

Pittsburgh steel mills have increased ingot output to an average of 20 per cent. Valley at 25 per cent, Wheeling at 40 per cent.

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Very little tonnage accumulated during holiday shutdowns, and current orders are meager.

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Price tone still weak. Heavy melting steel slightly lower.

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Pig Iron

Buying is still lacking. The increase in freight rates, effective on Monday, brought in few specifications. Carload lots constitute the bulk of current business. Quoted prices are being generally adhered to.

Semi-Finished Steel

Prices are not clearly established in a market which lacks sizable sales, but shipments have improved slightly since the beginning of the year.

Bars, Plates and Shapes

Little tonnage was closed in the last week of the year, and scarcely any inquiry developed. Structural fabricators expect the volume of new business to improve before the end of the month. There is some prospect for private barge buying in the first quarter, but action in most cases depends upon the trend of general business. Reinforcing bars are quiet, with weather conditions preventing activity on most projects. Specifications for merchant bars are very light, and little alloy material is going to the automobile industry.

Prices have changed very little in the last week, despite the efforts of mills to reestablish recent maximum levels. On bars, 1.60c., Pittsburgh, still represents the market to small buyers, but the larger users are able to place contracts at less. The 1.60c. price on plates and shapes applies to scarcely any tonnage, and concessions of $2, and even $4, on shapes are not uncommon.

Tubular Goods

Active line pipe projects are lacking, but mills which have made a survey of the year's prospects are hoping that substantial tonnages will be placed in the spring. Funds are already available for extensive pipe line projects, many of which are certain to materialize. The market on standard pipe is dull, and, although distributers' stocks are low, they have not yet begun to build them up. Pipe mill operations continue at minimum levels.

Wire Products

Specifications for merchant wire products showed satisfactory gains in the last week of the year, as users completed releases against old contracts which ran out Jan. 1. Mills will have until Jan. 15 to ship against such orders, and will likely take specifications up to that date. The current market on manufacturers' wire is unchanged at 2.20c., Pittsburgh, and a few nail contracts are being closed at $1.95 a keg, Pittsburgh.

Sheets

It is too early in the new month to gage the trend of sheet specifications accurately, the past week having been particularly quiet. Releases to date have been of a routine nature, indicating no interest on the part of buyers in future contracting. The price situation is also unfavorable to new business. Some of the automobile companies are taking sheet steel in fair volume, but others have held up releases and seem to be waiting the action of the Ford Motor Co. before making further commitments. Operations are a bit higher, although the industry still averages close to 20 per cent of capacity.

Tin Plate

Production has gained some of the ground lost during the holidays, and now averages 40 to 45 per cent of capacity.

Strip Steel

Releases show no gain thus far in the month, although the last week in December made a slight improvement over its predecessor. Mill operations still average under 20 per cent of capacity, with many plants on alternate week schedules. Prices are unchanged at 1.45c. and 1.55c., Pittsburgh, on hot-rolled strip and 2c. to 2.05c. on cold-rolled, although there have been concessions on the latter to 1.90c.

Coke and Coal

Colder weather has not stimulated the domestic market very much, and both foundry and furnace coke are very dull. Shipments of the foundry grade are slightly heavier over the week-end because of the 6c. a ton advance in freight rates, which became effective Jan. 4.

Old Material

Small sales of No. 1 heavy melting steel have been made at $10 and $10.25, and the $10.50 maximum, which has prevailed for some time, seems to have disappeared. However, scrap is still difficult to buy, and dealers are unable to pick up anything but occasional odd cars at less than $10. Sales of blast furnace scrap and machine shop turnings have been made during the week at $7, confirming the recent price range.

Chicago Mills Taking Firmer Stand on Prices of Plates, Shapes, Bars

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CHICAGO, Jan. 5.—Although some consumers of iron and steel have entered specifications, the market as a whole seems to be taking a breathing spell which tends to cloud the view of the near future. Producers are taking a firmer stand on prices of plates, shapes and bars.

Output has gained moderately to 20 per cent of ingot capacity, with rather a large portion of cold metal in use.

The new freight rates have had little effect on the finished steel market. However, numerous small releases of pig iron near the year-end now serve as a check on shipments in the opening week of the new year.

Specifications from automobile plants are growing slowly, and farm implement manufacturers are making a little headway. Men being called back to railroad shops give promise of heavier use of steel mill products in that direction. The spread of wage cuts among railroad employees is taken by the trade as a good sign; however, little in the way of market stimulation is expected to result for 60 to 90 days.

Pig Iron

This market is extremely dull following a sharp increase in shipments near the year-end as numerous consumers took in carloads before freight rates changed. New buying is at a standstill, and specifications give no indication as to the course of the market in the near future. Two merchant stacks remain in blast at about 40 per cent of rating.

Ferroalloys

A few small contracts are being closed. Shipments are very light.

Bolts, Nuts and Rivets

Releases by farm implement manufacturers are slightly larger and further growth is promised. Shipments are somewhat larger to railroad shops, where additional men are being put to work on a short-week basis.

Warehouse Business

Incoming orders are more numerous, and inquiries are decidedly improved. Sheared plates up to 2 in. thick and universal mill plates in stock widths up to 24 in. and in all

Ingot out of Chicago district has gained moderately to 20 per cent of capacity.

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Chicago mills taking firm stand at 1.70c. a lb. for plates, shapes and bars, a $2 a ton advance.

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Business recovering from year-end slump at very slow pace.

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thicknesses are being billed at $3 per 100 lb. Sheared plates 2 in. and thicker now carry an extra of 75c. per 100 lb.

Wire Products

December shipments topped those of November, and the tendency is for the gain to be carried forward into the new month. Producers look for growth in industrial demand to come rather promptly and expect use in rural districts to build up slowly. Output has been stepped up to 20 per cent of capacity, with 30 per cent operations expected by mid-January.

Cast Iron Pipe

Sellers are applying new freight rates, which add 40c. a ton to carload and less-carload lots from all points. The new rate from Birmingham to Chicago is $8.40 a ton and to Milwaukee $8.80. Several pipe foundries have resumed operations on a limited scale. Locally, the market is drab. Few inquiries are out and contemplated work is unusually light.

Billets

Rerolling billets are being quoted at $29 a ton, Chicago. Use is light.

Hot-Rolled Strip

Prices are steady. Producers have stepped up production to 25 per cent of capacity. Sellers look for further growth in output later this month.

Bars

Specifications from automobile manufacturers are up slightly, but other industrial users are slow in indicating January needs. Sellers are looking for larger use in railroad shops, where men are being called back to work. Rail steel bar mills are still down and may not resume operations until early next week.

Reinforcing Bars

Sufficient tonnage on inquiry has accumulated to improve the outlook in January. New warehouse prices are in effect and so far as is known all outstanding quotations at previous low figures have been cancelled. Minimum prices out of warehouse now are 1.75c. a lb. for billet bars and 1.55c. for the rail steel commodity. The trade expects award on Jan. 5 of 5000 tons for use by the Government on the Mississippi River at Rock Island, Ill.

Cold-Rolled Strip

Delivered prices at Chicago are up 2c. per 100 lb. because of the new freight rates. Quotations are 2.35c. a lb., delivered Chicago. Output is at 20 per cent of capacity.

Structural Material

Local fabricators estimate that fully 22,000 tons of new work is near the closing point. Fresh inquiries total only 4000 tons. Work on the Outer Bridge, Chicago, may be stopped because of lack of funds.

Rails and Track Supplies

One Chicago rail mill is idle and out of orders and the other unit is on a very low schedule.

Plates

An order for 3000 tons of tank plates has been placed. The current asking price is 1.70c. a pound. Deliveries in the immediate vicinity are light.

Coke

Shipments of by-product foundry coke are small, reflecting the idleness of many foundries. Prices are steady at $7.50 a ton, local ovens.

Sheets

This market is quiet, with output at 25 per cent of capacity. The roofing trade, which has been quiet for several months, may soon buy sheets that will be manufactured for early spring building work.

Old Material

Shipments to steel mills remain light. Prices are nominal in the absence of sales.

New York Market Still Dull; Protest Against Freight Rates

Steel Companies Will Ask Railroads to Adjust New Tariffs to Get Rid of Unwieldy Fractions

NEW YORK, Jan. 5.—Except for some stimulation of shipments of wire nails, brought about by a price advance and higher freight rates, the past week has been marked by the extreme dullness that prevailed throughout most of December.

The steel price situation is not improved, but it is no worse. Steel bar makers are trying to put into effect a dual price system, wherein large buyers will be supplied at 1.50c., Pittsburgh, and small users will be asked to pay 1.60c. Concessions from quoted prices are fairly common on structural shapes, but sales of plates are so small that current quotations are not undergoing a severe test.

A protest will be filed with the railroads by the steel industry relative to the new freight rates, which in the case of finished steel has resulted in intricate and unwieldly fractions, running in some instances to four decimals. For example, the Bethlehem-New York rate becomes 1.6775c. a lb. There will also be a protest of the pig iron rate, which provides for an increase of 12c. a net ton or 13.44c. a gross ton. An effort will be made to make this rate 12c. a gross ton.

Pig Iron

Current demand for pig iron is light, reflecting the general recession in foundry operations throughout the district. Pending business is comprised of carlots for quick shipment. Total sales in the past week, at 2000 tons, compare with 2500 tons the week before and 3000 tons two weeks ago.

With a 5000-ton cargo of Royal Dutch iron being discharged at Providence, R. I., and with iron being offered for delivery from a smaller consignment of that brand to arrive at Bridgeport, Conn., late in January, foreign iron is becoming a more active competitor in this district. Prices on domestic brands, however, remain unchanged, although a reduction on iron from one producing district is expected to be made in the early future.

Old Material

Eastern Pennsylvania steel mills have not resumed acceptance of scrap deliveries since the holidays, but the consumers at Conshohocken and Coatesville, Pa., are expected to do so before the end of this week. The first barge is now being loaded by the Bethlehem Steel Co. at West Twenty-ninth Street, New York, with Nos. 1 and 2 heavy melting steel for spring delivery to Lackawanna, N. Y.

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▲▲▲ PERSONALS ▲▲▲

A. G. BRYANT, general manager of the machinery division, Joseph T. Ryerson & Son, Chicago, has resigned, effective Dec. 31, 1931, after 20 years of service with the organization. Mr. Bryant will open an office at 400 West Madison Street, Chicago.

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CHARLES B. JAHNKE, since 1926 director of engineering, Fairbanks, Morse & Co., Beloit, Wis., has resigned. He joined the company in 1910 following his graduation from the mechanical engineering course at the University of Cincinnati. Mr. Jahnke is a former vice-president of the Society of Automotive Engineers.

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ERNST M. STERNBERG has been elected president, Sterling Motor Truck Co., Milwaukee, to succeed R. G. HAYSSEN, who has resigned. Mr. Hayssen remains a director. H. C. KEENAN and WILLIAM G. STERNBERG have been elected vice-presidents. CARL G. HAYSSEN, secretary, has resigned, and OSCAR HELD, treasurer, has been elected to that office.

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J. FREDERIC WIESE, who since 1926 has been assistant to the general manager of sales of Lukens Steel Co., Coatesville, Pa., has been appointed assistant to F. H. Gordon, vice-president in charge of sales. Mr. Wiese was formerly identified with the Parkesburg Iron Co., Parkesburg, Pa., as mill representative, with headquarters in Chicago.

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THOMAS M. SIMPSON, secretary, Continental Motors Corpn., Muskegon, Mich., has been elected first vice-president of the Michigan Manufacturers' Association. L. C. UPTON, president, Upton Machine Co., St. Joseph, was named third vice-president and M. J. MURPHY, United States Radiator Corpn., Detroit, became treasurer. FRED BUCK, president, Lufkin Rule Co., Saginaw; D. R. WILSON, president, Wilson Foundry & Machine Co., Pontiac, and EDGAR R. AILES, secretary-treasurer, Detroit Steel Products Co., Detroit, became directors for a three-year term. S. WELLS UTLEY, president, Detroit Steel Casting Co., retiring president of the association, and OTTO H. SCHULZ, president, Alloy Steel Spring & Axle Co., Jackson, were named directors to fill unexpired terms.

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▲▲ OBITUARY ▲▲

HUGO P. TIEMANN, assistant metallurgical engineer of the Carnegie Steel Co., Pittsburgh, died at the Homeopathic Hospital in that city on Jan. 3, from an illness resulting from burns received on Nov. 28. His association with the Carnegie company started in 1901 after his graduation in 1900 from Columbia University. He was first stationed at the Homestead works and later transferred to the Pittsburgh offices. Mr. Tiemann was best known as the author of "Iron and Steel," a pocket encyclopedia.

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FRED HOFFMANN, president, Hoffmann & Billings Mfg. Co., Milwaukee, pioneer manufacturer of plumbing and heating supplies, died Jan. 1, after a brief illness. He was born in Milwaukee in 1870, the son of J. C. Hoffmann, one of the founders of the company, whom he succeeded as president upon the latter's death in 1894.

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OTTO KONIGSLOW, president, Otto Konigslow Mfg. Co., Cleveland, died Jan. 3, aged 81 years. He established the business of which he was the head 50 years ago. He is survived by two sons, Otto Konigslow, Jr., and M. E. Konigslow, vice-president, factory manager and secretary-treasurer respectively of the Konigslow company.

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Water Shipment of Scrap Discussed in Boston

Shipment of scrap by barge or ship from Boston to Canadian and Atlantic Coast ports was discussed at a recent meeting of the Boston chapter, Institute of Scrap Iron and Steel. Salvation of the New England scrap trade lies in water shipment, particularly export to foreign countries, said Herman D. Moskowitz, president of the institute. The discussion which followed indicated that there is need of a scrap yard on tidewater, through which dealers might merge their export interests.

Eastern Pennsylvania Ingot Output Slightly Higher

Mills Operate to Replenish Stocks; Prices Generally Lack Firmness in Quiet Market

PHILADELPHIA, Jan. 5.—Small, scattered steel inquiry has appeared since the holidays. Steel mill operations, at about 15 per cent for eastern Pennsylvania, are slightly higher than the estimate of a week ago. One plant, which had not operated its open-hearth furnaces for three weeks, has started two, but another will not resume open-hearth output for another week or 10 days. Rolling mill schedules continue to be irregular, depending upon the volume of orders received each day.

Prices have generally settled to 1.60c., Coatesville, Pa., for plates, 1.50c., Pittsburgh, for bars, and 1.55c. to 1.60c., f.o.b. mill, for shapes. Sheet prices also lack strength, especially when a desirable tonnage is in prospect.

Pig Iron

Only occasional carloads of foundry iron have been inquired for since the turn of the year, and on such business $15 a ton is the usual quotation. Continued small buying is expected through this month, as most of the larger users are partly covered in their requirements.

Plates, Shapes and Bars

Quotations on plates are at 1.60c., Coatesville, Pa. On an opening of bids for tank plate requirements of the New York Central last week, eastern Pennsylvania mill quotations, delivered Newbury Junction, were 1.79½c. a lb. by the Lukens Steel Co., 1.8025c. by the Central Iron & Steel Co., 1.82c. by the Alan Wood Steel Co. The Worth Steel Co. quoted 1.65c., f.o.b. Claymont, Del. Demand for shapes is small, and prices lack firmness, ranging from 1.55c. to 1.60c., f.o.b. nearest mill to consumer. Bars are quiet and the market unchanged at 1.50c. a lb., Pittsburgh.

Sheets

On desirable inquiries for hot-rolled and annealed sheets, sellers are willing to quote 1.75c. a lb., Pittsburgh, for No. 10 gage. Prices on other grades of sheets lack strength, but no actual test has been afforded by a substantial order, although some fair-sized tonnages will be placed shortly by automobile body manufacturers.

Imports

In the week ended Jan. 2, arrivals at this port consisted of 400 tons of ferromanganese from Jugoslavia, 501 tons of pig iron from British India and 53 tons from the Netherlands, and 142 tons of structural shapes from Belgium.

Old Material

Most eastern Pennsylvania consumers of scrap are still delaying deliveries on contracts, and the only transactions in a quiet market have been carload lots of special grades.

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Cincinnati Pig Iron Releases Gain

CINCINNATI, Jan. 5.—Releases of pig iron on old contracts increased toward the end of last week, in a hurried effort of melters to escape higher freight rates. New business was about 1000 tons, including 500 tons of Northern iron and the usual weekly carload orders for immediate use.

Finished Steel

Despite the holiday period, demand for sheet steel was sustained the past week at slightly more than 30 per cent of capacity output. Forward buying is small.

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New England Pig Iron Sales at Low Ebb

BOSTON, Jan. 5.—Pig iron sales the past week were practically nil. At Providence, R. I., there arrived 5050 tons of Dutch iron. So far as can be ascertained little, if any, of this iron, has been sold. It is being offered at $16.25 to $16.50 a ton, delivered local yards. New freight tariffs show an increase of 12c. a net ton on pig iron shipments, or a little more than 13c. a gross ton. Thus, the added delivered cost of a 50-ton car of iron will be $6.72, on a net basis.

Cast Iron Pipe

That prices are still unsettled is attested by those submitted by foundries last week for the 2050 tons required by Boston. The United States Pipe & Foundry Co. bid $31.40 a ton, delivered, on 4-in. stock, and $28.40 on 6, 8, 12 and 16-in. The Warren Pipe Co. of New England, Inc., bid $35 a ton on the 4-in., $29 on the 6, 8 and 12-in., and $28.50 on the 16-in. R. D. Wood & Co. bid $36.20 on the 4-in. and $33.20 on other sizes. Based on a $5.60 rail freight, $28.40 a ton on 6-in. and larger sizes figures back to $22.80 a ton, foundry. The United States Pipe & Foundry Co. bid, however, was based on a barge rate.

Coke

New freight rates on foundry coke from Pennsylvania and New England ovens are 6c. a net ton, and switching charges 10 per cent higher, according to new tariffs. New England by-product coke makers are absorbing the additional charges.

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Birmingham Steel Plant Operations Higher

BIRMINGHAM, Jan. 5.—December was a lean month for Birmingham producers of pig iron, and the outlook for January is not encouraging, although there will be some improvement over last month, as plants resume operations after the holiday shutdown. The pig iron industry in this district starts the year with very large yard stocks and operations at an extremely low level. Quotations for district business are still holding at a base of $12. Five furnaces are in operation, the Tennessee company having three, Sloss-Sheffield one and the Republic Steel one.

Finished Steel

Buying since Christmas has been restricted, although some first quarter contracts have been placed, such as for sheets and some lines of wire products. Shipments last week were better than generally expected. The Tennessee company resumed operations at its Ensley rail mill on Monday. This company will also operate five open-hearths at Ensley this week, in addition to four open-hearths at Fairfield. Gulf States Steel is resuming operations this week.

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St. Louis Pig Iron Demand Heavier in December

ST. LOUIS, Jan. 5.—December shipments of pig iron by the St. Louis Gas & Coke Corpn. were 45 per cent larger than those of November. Most of these specifications came from manufacturers of agricultural implements in the St. Louis territory, there having been very little spot business. Quotations at furnaces are unchanged, but the new freight rates slightly increase delivered prices.

Finished Material

The advance in freight rates, effective Jan. 4, stimulated only a small amount of new business. However, mills were urged to make shipments of material already purchased in time to take advantage of the lower rate.

Cleveland Mills at 32 Per Cent; No Gain in Orders for Steel

Some Business Evidently Being Held Back Until Price Situation Has Become Settled

CLEVELAND, Jan. 5.—The volume of business in finished steel during the first week of the new year showed little variation from that of the latter part of December. Some fair orders for sheets and strip steel came from the motor car industry in Michigan, although there was very little business in these products in this territory. Activity in the heavier rolled steel products was limited mostly to bar orders. Few plants in metal-working industries are buying steel to replenish stocks.

While some consumers have placed first quarter contracts, little general interest is being shown in contracts. Some business evidently is being held back until the price situation has become more settled.

Cleveland steel plants are operating this week at 32 per cent of ingot capacity, the same as since early in December, except for the holiday suspension.

Activity in the building field is very light, inquiry for fabricated work being confined to small lots.

The Nickel Plate Railroad is expected to have out its 1932 rail inquiry shortly. The Erie Railroad rails are still pending.

Interest in prices for the moment is confined largely to plates and shapes. While formal announcements are lacking, these products appear to have settled down to 1.50c. to 1.60c., Pittsburgh, for current orders and contracts, the lower price applying to backlog tonnage and other good-sized orders and the higher to small miscellaneous lots. Most producers apparently have fallen in line with the previously announced 1.55c., Cleveland, price for steel bars, with a $2 a ton higher asking price for small lots. There are reports of shading on auto body sheets and there is lower price trend on cold-rolled strip. No further weakness is apparent on hot-rolled strip.

Pig Iron

Sales were very light during the week and little inquiry is pending. Whether business in this territory will increase this month will depend largely upon the activities of jobbing foundries, which now have little work. Two leading motor car plants in Michigan are taking good tonnages. While the freight rate advance authorized by the Interstate Commerce Commission is based on net tons, the Ohio Railway Commission has ruled that for intrastate shipments freight advances are to be figured on either a gross or net ton basis according to the way the commodity is sold. Consequently, the rate advance for shipments wholly within Ohio is 12c. a gross ton. Prices are unchanged.

Sheets

The motor car industry placed quite a few orders during the week, but all were for small lots for early needs. Concessions to 2.90c. are reported on auto body sheets. Galvanized sheets are firm in this market at 2.90c. Other prices are unchanged, although there are reports of weakness on enameling sheets.

Strip Steel

Some new business in both hot and cold-rolled strip was placed by automobile manufacturers and parts makers during the week. Prices appear stable at 1.45c. for wide and 1.50c. for narrow hot-rolled material, with a concession of $1 a ton to large consumers. Cold-rolled strip is weaker, sales being reported at 1.90c., Cleveland, for round lots.

Bars, Plates and Shapes

Quite a few orders for steel bars, largely from bolt and nut manufacturers and makers of automobile parts, have come out since the first of the year. The seasonal slowing down in the demand for reinforcing bars is in evidence, activity being confined to highway bridge work. Structural material and plates are very quiet.

Old Material

Scrap is moving to mills in the same volume as during the past week or two. While some releases were expected this week from Valley district mills, these have not materialized. No new inquiry has come out. Prices are unchanged.

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Pacific Coast Business to Be Aided by $23,000,000 Highway Construction Program

SAN FRANCISCO, Jan. 4.—A backlog of demand for reinforcing and structural steel during the coming year in California will be the State highway and bridge program, which is announced as involving an expenditure of $23,000,000 for over 400 miles of road construction and paving. The bridge program involves 16 major bridge projects and eight grade separations, for which $2,500,000 has been appropriated. Specifications and calls for bids will be released steadily to spread construction evenly throughout the year.

To provide for the rail freight rate increase in effect this week, the schedule on sheets has been advanced 2c. per 100 lb. by mills quoting a delivered price at Pacific Coast ports. Because of the highly competitive market on plates and shapes, the advance has not yet been definitely reflected in those schedules. After holding firm for six months, sheet prices are weakening.

In view of the holidays and year-end, reported awards for the past week are surprisingly steady, though in some cases they represent contracts made before the Christmas interruption. New inquiries for definite tonnages are few. Contracts for 2450 tons of reinforcing bars, 3000 tons of structural shapes and 400 tons of plates are reported, with less than 1000 tons of new inquiries.

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Buffalo Steel Operations Low This Week

BUFFALO, Jan. 5.—No sizable pig iron inquiry has developed this month, although producers believe that a considerable tonnage will be placed at the reduced prices. Shipments in December were very low.

Finished Steel

The Lackawanna plant of Bethlehem Steel continues to operate five open-hearth furnaces. Republic Steel is not operating at all this week.

Old Material

The leading consumer is continuing to offer $8 for No. 1 heavy melting steel, and has received over 3000 tons on this basis.

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Sales in 1929 by 206 plants making tin cans and other tinware totaled $256,130,000, of which 91.6 per cent, or $234,516,000, represented sales to industrial consumers, according to the Census of Distribution.

Metals Quiet; World Tin Supply Larger; December Copper Exports 25,500 Tons

NEW YORK, Jan. 5.—Electrolytic copper has been decidedly inactive in the past week, but most consumers are taking full shipments on contracts, and the carryover of uncompleted contracts from December is small. The domestic price of electrolytic copper continues firm at 7.25c. a lb., delivered Connecticut Valley, and the price of Copper Exporters, Inc., is unchanged at 7.50c. a lb., delivered usual European ports. Export sales have been of minor importance since Jan. 1, but the total of 25,500 tons sold abroad in December is considered highly satisfactory. Lake copper is quiet and the price unchanged at 7.37½c. a lb., delivered.

Copper Averages

The average price of Lake copper, based on daily quotations in THE IRON AGE, is 7.12½c. a lb., delivered New York, for December. The average price of electrolytic copper is 6.60c., refinery, or 6.85c., delivered in the Connecticut Valley.

Tin

Only a small total of tin has been bought in the past week, and practically all has been for spot shipment. The price in the New York market has lacked firmness, and the quotation has declined from 21.75c. on Dec. 30 to 20.75c. a lb. today. The London market today is £136 17s. 6d. for spot standard, £139 17s. 6d. for future standard, £139 12s. 6d. for spot Straits, and £144 5s. for delivery from Singapore. Stocks of tin in United Kingdom warehouses, at 31,579 tons, have increased 666 tons in a week. Statistics for December show an increase in the visible supply of tin of 730 tons to a total at the end of the month of 51,313 tons. Last month's shipments to the United States consisted of 3300 tons to the Atlantic Coast and 80 tons to the Pacific Coast. Not included in the visible supply is a carryover of 8293 tons in the Straits. While this total marks a reduction of 276 tons from the carryover at the end of November, it compares with only 4483 tons carried over at the end of December, 1930.

Lead

Following an inactive market during the holidays, some carload business has been done, but only a small volume of buying is expected for the rest of this month, as consumers have covered about two-thirds of requirements. With production of lead well balanced to current demand, the price is firm at 3.75c., New York, and 3.55c., St. Louis.

Zinc

Small buying of zinc developed between Christmas and the new year, but the market in general is quiet and prices show no particular strength at 3.47½c. a lb., New York, and 3.12½c., East St. Louis.

Antimony

Prices of the Chinese and domestic metal are unchanged at 6.15c., duty paid, New York, for prompt shipment and 5.95c., duty paid, New York, for future. With stocks substantially increased in the United States, having been doubled in December by shipments from China on consignment, prices show no tendency to advance.

Japanese Testing 75-Ft. Rails

YOKOHAMA, JAPAN, Nov. 25.—A trial order of 37 tons of heavy rails, 75 ft. in length, has been rolled for the Imperial Government Railways by the Government Steel Works. These will be tested in actual service to determine the desirability of adopting this length as standard.

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Detroit Scrap Market in Further Decline

DETROIT, Jan. 5.—With an increasing number of consumers asking for temporary suspension of deliveries on current contracts and with production of scrap in this district gaining, prices have been further depressed.

The Week's Prices. Cents Per Pound for Early Delivery

	Jan. 5	Jan. 4	Jan. 2	Dec. 31	Dec. 30
Lake copper, New York	7.37½	7.37½	7.37½	7.37½	7.37½
Electrolytic copper, N. Y.*	7.00	7.00	7.00	7.00	7.00
Straits tin, spot, N. Y.	20.75	21.10	....	21.62½	21.75
Zinc, East St. Louis	3.12½	3.12½	3.12½	3.12½	3.15
Zinc, New York	3.47½	3.47½	3.47½	3.47½	3.50
Lead, St. Louis	3.55	3.55	3.55	3.55	3.55
Lead, New York	3.75	3.75	3.75	3.75	3.75

*Refinery quotation; price ¼c. higher delivered in the Connecticut Valley.

Aluminum, 98 to 99 per cent pure, 22.90c. a lb., delivered.
Nickel, electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered.
Antimony, 6.15c. a lb., New York.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig	23.75c. to 24.75c.
Tin, bar	25.75c. to 27.75c.
Copper, Lake	8.50c. to 9.50c.
Copper, electrolytic	8.25c. to 9.25c.
Copper, casting	8.00c. to 9.00c.
*Copper sheets, hot-rolled	16.37½c.
*High brass sheets	13.25c.
*Seamless brass tubes	16.50c.
*Seamless copper tubes	15.87½c.
*Brass rods	11.00c.
*Brazed brass tubes	22.00c.
Zinc, slab	4.75c. to 5.25c.
Zinc sheets (No. 9), casks	9.25c. to 9.50c.
Lead, American pig	4.50c. to 5.00c.
Lead, bar	6.25c. to 7.25c.
Lead sheets	8.25c.
Antimony, Asiatic	9.00c. to 10.00c.
Alum., virgin, 99 per cent plus	23.30c.
Alum. No. 1 for remelting, 98 to 99 per cent	17.00c. to 18.00c.
Solder, ½ and ½	15.25c. to 16.25c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

Metals from Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig	26.00c.
Tin, bar	28.00c.
Copper, Lake	8.37½c.
Copper, electrolytic	8.37½c.
Copper, casting	8.00c.
Zinc, slab	4.75c. to 5.00c.
Lead, American pig	4.30c. to 4.50c.
Lead, bar	7.75c.
Antimony, Asiatic	10.00c.
Babbitt metal, medium grade	15.00c.
Babbitt metal, high grade	30.00c.
Solder, ½ and ½	18.00c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	5.50c.	6.25c.
Copper, hvy. and wire	5.25c.	6.00c.
Copper, light and bottoms	4.25c.	5.00c.
Brass, heavy	2.75c.	3.50c.
Brass, light	2.25c.	3.00c.
Hvy. machine composition	4.25c.	5.00c.
No. 1 yel. brass turnings	3.25c.	3.75c.
No. 1 red brass or compos. turnings	3.75c.	4.50c.
Lead, heavy	2.75c.	3.125c.
Zinc	1.25c.	1.75c.
Cast aluminum	3.25c.	5.00c.
Sheet aluminum	9.00c.	11.00c.

Pig Iron Production Below 1,000,000 Tons

PRODUCTION of coke pig iron in December amounted to 980,376 gross tons, an average of 31,625 tons daily. This compares with 1,103,472 tons in November and a daily average of 36,782 tons.

Both the daily average and the month's total make new low records for the past ten years. The most recent lower totals were those for August, 1921, at 954,193 tons for the month and a daily average of 30,780 tons. Except for August and July, 1921, it is necessary to go back to November, 1900, to find a lower average daily rate.

Furnaces in operation Dec. 1, at 67, were already lower than the number of stacks in blast at the bottom of the 1921 depression, that being 69 on Aug. 1. A net December loss of 11 furnaces, however, has now reduced the figure to 56, which is by far the lowest of the twentieth century and probably below that of any time since the summer of 1894. The 56 furnaces now blowing are making iron at a daily rate of 29,365 tons, compared with 35,810 tons a month earlier for 67 furnaces.

Three furnaces were blown in during December and 14 were blown out. All three furnaces going into action were United States Steel Corpn. stacks; that corporation put four furnaces out. Independent steel companies lost eight furnaces with none going in, and two merchant stacks went out and none in. The three furnaces going in include No. 1 at the Clairton plant of the Carnegie Steel Co. in the Pittsburgh district, and Nos. 3 and 6 of the Tennessee company, at the Ensley plant in Alabama.

Production of Coke Pig Iron and of Ferromanganese

Gross Tons

	Pig Iron*		Ferromanganese†	
	1930	1931	1930	1931
January	2,827,464	1,714,266	27,260	14,251
February	2,838,920	1,706,621	21,310	19,480
March	3,246,171	2,032,248	23,345	27,899
April	3,181,868	2,019,529	27,777	25,456
May	3,232,760	1,994,082	30,296	23,959
June	2,934,129	1,638,627	27,327	11,243
½ year	18,261,312	11,105,373	157,325	122,288
July	2,639,537	1,463,220	17,728	17,776
August	2,523,921	1,280,526	20,909	12,482
September	2,276,770	1,168,915	21,181	14,393
October	2,184,768	1,173,283	24,480	14,739
November	1,867,107	1,103,472	18,619	14,705
December	1,665,690	980,376	16,288	15,732
Year	31,399,105	18,275,165	276,530	212,115

*These totals do not include charcoal pig iron. The 1930 production of this iron was 96,580 gross tons.
†Included in pig iron figures.

Daily Average Production of Coke Pig Iron

Gross Tons

	1929	1930	1931
January	111,044	91,209	55,299
February	114,507	101,390	60,950
March	119,822	104,715	65,556
April	122,087	106,062	67,317
May	125,745	104,283	64,325
June	123,908	97,804	54,621
½ year	119,564	100,891	61,356
July	122,100	85,146	47,201
August	121,151	81,417	41,308
September	116,585	75,890	38,964
October	115,745	69,831	37,848
November	106,047	62,237	36,782
December	91,513	53,732	31,625
Year	115,851	86,025	50,069

Merchant Iron Made, Daily Rate

1930	*Tons*	1931	*Tons*
Nov.	12,507	May	13,212
Dec.	12,780	June	11,209
		July	12,012
1931		Aug.	9,569
Jan.	9,416	Sept.	8,985
Feb.	11,332	Oct.	7,051
March	11,481	Nov.	5,758
April	13,439	Dec.	6,778

Production by Districts and Coke Furnaces in Blast

District	Production (Gross Tons) December (31 Days)	Production (Gross Tons) November (30 Days)	January 1 Number in Blast	January 1 Operating Rate, Tons a Day	December 1 Number in Blast	December 1 Operating Rate, Tons a Day
Buffalo	77,629	77,125	5	2,505	5	2,570
Other New York and Mass.	6,965	13,030	1	225	1	435
New Jersey	....	....	..	....	0	....
Pennsylvania:						
Lehigh Valley*	34,358	34,206	3	1,110	3	1,140
Schuylkill Valley	....	5,510	0	....	0	....
Susquehanna and Lebanon Valleys	15,415	16,961	1	500	1	565
Ferromanganese	....	....	..	....	0	....
Pittsburgh District	176,002	179,599	9	5,670	9	5,885
Ferro. and Spiegel	4,356	4,135	1	145	1	140
Shenango Valley	13,339	9,143	0	....	1	310
Western Pennsylvania	15,938	20,352	1	515	1	680
Ferro. and Spiegel	6,624	6,390	1	215	1	215
Maryland	39,455	61,752	2	1,275	3	2,175
Wheeling District	98,668	103,073	3	2,095	5	3,435
Ohio:						
Mahoning Valley	63,259	103,795	3	1,510	7	3,380
Central and Northern	80,381	105,539	5	2,595	7	3,405
Southern	11,489	22,546	1	325	1	360
Illinois and Indiana	221,981	212,556	11	6,785	11	6,860
Mich., Wis. and Minn.	20,033	23,617	2	645	2	785
Colo., Mo. and Utah	9,840	9,008	1	320	1	300
Virginia	....	....	0	....	0	....
Kentucky	3,529	8,727	0	....	1	290
Alabama	81,115	86,408	6	2,930	6	2,880
Ferromanganese	....	....	0	....	0	....
Tennessee	....	....	0	....	0	....
Total	980,376	1,103,472	56	29,365	67	35,810

*Includes spiegeleisen.

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Iron Ore Output in 1931 Declined 47 Per Cent

Iron ore mined in the United States in 1931, exclusive of ore that contained 5 per cent or more of manganese in the natural state, is estimated by the United States Bureau of Mines at 31,068,000 gross tons, a decrease of 47 per cent, compared with that mined in 1930.

The ore shipped from the mines in 1931 is estimated at 28,517,000 gross tons, valued at $74,579,000, a decrease of 48 per cent in quantity and of 49 per cent in total value, compared with the figures for 1930. The average value of the ore per gross ton at the mines in 1931 is estimated at $2.62; in 1930 it was $2.64. The stocks of iron ore at the mines, mainly in Michigan and Minnesota, apparently increased from 10,383,152 gross tons in 1930 to 12,972,000 tons in 1931, or 25 per cent.

Imports of iron ore reported for the 11 months ended Nov. 30, 1931, amounted to 1,375,726 gross tons, valued at $3,661,432, or $2.66 a ton. The imports for 1930 were 2,775,124 gross tons, valued at $8,113,039, or $2.92 a ton. The reported exports of iron ore for the 11 months ended Nov. 30, 1931, amounted to 435,403 gross tons, valued at $1,656,931, or $3.81 a ton, compared with exports for the entire year 1930 of 752,267 tons, valued at $2,734,168, or $3.63 a ton.

▲▲▲ Prices of Finished and Semi-Finished Steel,

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill	1.50c. to 1.60c.
F.o.b. Chicago	1.60c. to 1.70c.
Del'd Philadelphia	1.81c. to 1.91c.
Del'd New York	1.85c. to 1.95c.
F.o.b. Cleveland	1.55c. to 1.65c.
F.o.b. Lackawanna	1.60c. to 1.70c.
F.o.b. Birmingham	1.70c.
C.i.f. Pacific ports	2.00c.

Billet Steel Reinforcing

F.o.b. P'gh mills, 40, 50, 60-ft.	1.60c.
F.o.b. Birmingham, mill lengths	1.75c.
F.o.b. Cleveland	1.40c. to 1.50c.

Rail Steel

F.o.b. mills, east of Chicago dist.	1.30c. to 1.35c.
F.o.b. Chicago Heights mill	1.50c. to 1.60c.
Del'd Philadelphia	1.49c. to 1.59c.

Iron

Common iron, f.o.b. Chicago	1.60c. to 1.70c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	2.11c.
Common iron, del'd New York	2.15c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill	1.50c. to 1.60c.
F.o.b. Chicago	1.60c. to 1.70c.
F.o.b. Birmingham	1.70c.
Del'd Cleveland	1.703c. to 1.803c.
Del'd Philadelphia	1.693c. to 1.743c.
F.o.b. Coatesville	1.60c. to 1.70c.
F.o.b. Sparrows Point	1.60c. to 1.70c.
F.o.b. Lackawanna	1.60c. to 1.70c.
Del'd New York	1.798c. to 1.898c.
C.i.f. Pacific ports	1.80c. to 1.85c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill	1.50c. to 1.60c.
F.o.b. Chicago	1.60c. to 1.70c.
F.o.b. Birmingham	1.70c.
F.o.b. Lackawanna	1.60c. to 1.70c.
F.o.b. Bethlehem	1.60c. to 1.70c.
Del'd Cleveland	1.703c. to 1.803c.
Del'd Philadelphia	1.649c. to 1.699c.
Del'd New York	1.767c. to 1.867c.
C.i.f. Pacific ports (standard)	2.05c.
C.i.f. Pacific ports (wide flange)	2.15c.

Alloy Steel Bars

(F.o.b. maker's mill)

Alloy Quantity Bar Base, 2.65c. per Lb.

S.A.E. Series Numbers		Alloy Differential per 100 Lb.
2000	(1¼% Nickel)	$0.25
2100	(1½% Nickel)	0.55
2300	(3½% Nickel)	1.50
2500	(5% Nickel)	2.25
3100	Nickel Chromium	0.55
3200	Nickel Chromium	1.35
3500	Nickel Chromium	3.80
3400	Nickel Chromium	3.20
4100	Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100	Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600	Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.50 to 2.00 Nickel)	1.05
5100	Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100	Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100	Chromium Spring Steel	0.20
6100	Chromium Vanadium Bar	1.20
6100	Chromium Vanadium Spring Steel	0.95
9250	Silicon Manganese Spring Steel (flats)	0.25
	Rounds and squares	0.50
	Chromium Nickel Vanadium	1.50
	Carbon Vanadium	0.85

Above prices are for hot-rolled steel bars, forging quality. The differential for cold-drawn bars is ¾c. a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a section area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2½ in. thick, regardless of sectional area, take the bar price.

Cold-Finished Bars

	Base per Lb.
Bars, f.o.b. Pittsburgh mill	2.00c.
Bars, f.o.b. Chicago	2.00c.
Bars, Cleveland	2.00c.
Bars, Buffalo	2.00c.
Shafting, ground, f.o.b. mill	*2.35c. to 3.30c.

*According to size.

SHEETS, STRIP, TIN PLATE, TERNE PLATE

Sheets

Hot-Rolled

	Base per Lb.
No. 10, f.o.b. Pittsburgh	1.60c. to 1.70c.
No. 10, f.o.b. Chicago mills	1.75c. to 1.80c.
No. 10, del'd Philadelphia	1.96c. to 2.01c.
No. 10, f.o.b. Birmingham	1.85c.
No. 10, c.i.f. Pacific Coast ports	2.35c.

Hot-Rolled and Annealed

No. 10, Pittsburgh	1.75c. to 1.80c.
No. 10, Chicago mills	1.85c. to 1.90c.
No. 10, Birmingham	1.95c. to 2.00c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.25 to 2.35c.
No. 24, f.o.b. Chicago mills	2.40c. to 2.50c.
No. 24, del'd Philadelphia	2.61c. to 2.71c.
No. 24, f.o.b. Birmingham	2.50c. to 2.55c.
No. 24, c.i.f. Pacific Coast ports	2.90c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh	2.25c.
No. 10 gage, f.o.b. Chicago mills	2.35c.
No. 10 gage, del'd Philadelphia	2.56c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pitsburgh	2.85c.
No. 20 gage, f.o.b. Chicago mills	2.95c.
No. 20 gage, del'd Philadelphia	3.16c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh	2.90c. to 3.00c.

Steel Furniture Sheets

No. 10, f.o.b. Pittsburgh	2.65c.
No. 20, f.o.b. Pittsburgh	3.25c.

(Prices on furniture stock include stretcher leveling but not resquaring.)

Galvanized Sheets

No. 24, f.o.b. Pittsburgh	2.80c. to 2.90c.
No. 24, f.o.b. Chicago mills	2.90c. to 3.00c.
No. 24, del'd Philadelphia	3.09c. to 3.19c.
No. 24, f.o.b. Birmingham	2.95c. to 3.05c.
No. 24, c.i.f. Pacific Coast ports	3.40c.

Long Ternes

No. 24, unassorted, 8-lb. coating, f.o.b. P'gh	2.90c. to 3.00c.

Vitreous Enameling Stock

No. 10, f.o.b. Pittsburgh	2.75c.
No. 20, f.o.b. Pittsburgh	3.25c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.50c. to 2.60c.
No. 28, Chicago mills	2.60c. to 2.70c.

Tin Plate

	Base per Box
Standard cokes, f.o.b. P'gh district mills	$4.75
Standard cokes, f.o.b. Gary	4.85

Terne Plate

(*F.o.b. Morgantown or Pittsburgh*)

(Per Package, 20 x 28 in.)

8-lb. coating I.C. $9.50	25-lb. coating I.C. $14.10
15-lb. coating I.C. 12.00	30-lb. coating I.C. 14.90
20-lb. coating I.C. 13.00	40-lb. coating I.C. 16.70

Hot-Rolled Hoops, Bands and Strips

	Base per Lb.
6 in. and narrower, Pittsburgh	1.55c. to 1.60c.
Wider than 6 in., P'gh	1.45c. to 1.55c.
6 in. and narrower, Chicago	1.65c. to 1.70c.
Wider than 6 in., Chicago	1.55c. to 1.65c.
Cooperage stock, P'gh	1.60c. to 1.70c.
Cooperage stock, Chicago	1.70c. to 1.80c.

Cold-Rolled Strips

F.o.b. P'gh	1.95c. to 2.05c.
F.o.b. Cleveland	1.90c. to 2.05c.
F.o.b. del'd Chicago	2.35c.
F.o.b. Worcester	2.15c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland	2.90c. to 3.00c.

STEEL PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld

Steel Inches	Black	Galv.	*Iron* Inches	Black	Galv.
⅛	47	21½	¼ and ⅜	+11	+36
¼ to ⅜	53	27½	½	23	5
½	58	44½	¾	28	11
¾	62	50½	1 and 1¼	31	15
1 to 3	64	52½	1½ and 2	35	18

Lap Weld

2	57	45½	2	23	9
2½ to 6	61	49½	2½ to 3½	28	13
7 and 8	58	45½	4 to 6	30	17
9 and 10	56	43½	7 and 8	29	16
11 and 12	55	42½	9 to 12	26	11

Butt Weld, extra strong, plain ends

¼	43	26½	¼ and ⅜	+13	+48
¼ to ⅜	49	32½	½	23	7
½	55	44½	¾	28	12
¾	60	49¼	1 to 2	34	18
1 to 1½	62	51½			
2 to 3	63	52½			

Lap Welds, extra strong, plain ends

2	55	44½	2	29	13
2½ to 4	59	48½	2½ to 4	34	20
4½ to 6	58	47½	4½ to 6	33	19
7 to 8	54	41½	7 and 8	31	17
9 and 10	47	34½	9 to 12	21	8
11 and 12	46	33½			

On carloads the above discounts on steel pipe are increased on black by one point, with supplementary discounts of 5 and 2½%, and on galvanized by 1½ points with supplementary discounts of 5 and 2½%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discounts of 5 and 2½%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel		*Charcoal Iron*	
2 in. and 2¼ in.	38	1½ in.	1
2½ in.—2¾ in.	46	1¾ in.	8
3 in.	52	2 in.—2¼ in.	13
3¼ in.—3¾ in.	54	2½ in.—2¾ in.	16
4 in.	57	3 in.	17
4½ in. to 6 in.	46	3¼ in. to 3½ in.	18
		4 in.	20
		4½ in.	21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap Welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload, 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold Drawn

1 in.	61	3 in.	46
1¼ to 1½ in.	53	3¼ to 3½ in.	48
1¾ in.	37	4 in.	51
2 to 2¼ in.	32	4½, 5 and 6 in.	40
2½ to 2¾ in.	40		

Hot Rolled

2 and 2¼ in.	38	3½ to 3½ in.	54
2½ and 2¾ in.	46	4 in.	57
3 in.	52	4½, 5 and 6 in.	46

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb., base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points, with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gages take the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

	Per Cent Off List
Carbon, 0.10% to 0.30% base (carloads)	55
Carbon, 0.30% to 0.40% base	50

Plus differential for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.

Bolts, Nuts, Coke, Coal, Fuel Oil, Cast Iron Pipe ▲▲▲

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland) (After Dec. 31, extras of 10c. a 100 lb. on mixed and joint carloads, 25c. on pool carloads and 40c. on less than carloads will be applied on all merchant wire products.)

To Manufacturing Trade

Bright wire	2.20c.
Spring wire	3.20c.

To Jobbing Trade

	Base per Keg
Standard wire nails	$1.95
Smooth coated nails	1.95
Galvanized nails	3.90

	Base per Lb.
Smooth annealed wire	2.35c.
Smooth galvanized wire	2.80c.
Polished staples	2.50c.
Galvanized staples	2.75c.
Barbed wire, galvanized	2.60c.

Woven wire fence, Nos. 9 and 11 gage, per net ton	$55.00
Woven wire fence, No. 12½ gage and lighter, per net ton	60.00

Anderson, Ind., mill prices are ordinarily $1 a ton over Pittsburgh base; Duluth, Minn., and Worcester, Mass., mill $2 a ton over Pittsburgh, and Birmingham mill $3 a ton over Pittsburgh.

RAILS AND TRACK SUPPLIES

Rails

	Per Gross Ton
Standard, f.o.b. mill	$43.00
Light (from billets), f.o.b. mill	34.00
Light (from rail steel), f.o.b. mill	32.00

Track Equipment

	Base per 100 Lb.
Spikes, ⅝-in. and larger	$2.60
Spikes, ½-in. and larger	2.60
Spikes, boat and barge	2.80
Tie plate, steel	1.85
Angle bars	2.75
Track bolts, to steam railroads	3.50
Track bolts, to jobbers, all sizes, per 100 count	73 per cent off list

BOLTS, NUTS RIVETS AND SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
†Machine bolts	73, 10 and 10
†Carriage bolts	73, 10 and 10
Lag bolts	73, 10 and 10
Plow bolts, Nos. 1, 2, 3 and 7 heads	73, 10 and 10
Hot-pressed nuts, blank or tapped, square	73, 10 and 10
Hot-pressed nuts, blank or tapped, hexagons	73, 10 and 10
C.p.c. and t. square or hex. nuts, blank or tapped	73, 10 and 10
Washers*	7.00c. to 6.75c. per lb. off list

*F.o.b. Chicago, New York and Pittsburgh.
†Bolts with rolled thread up to and including ⅝ in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts

	Per Cent Off List
Semi-finished hexagon nuts	73, 10 and 10
Semi-finished hexagon castellated nuts, S.A.E.	73, 10 and 10
Stove bolts in packages, P'gh	80, 25 and 10
Stove bolts in packages, Ch'go	80, 25 and 10
Stove bolts in pkgs., Cleveland	80, 25 and 10
Stove bolts in bulk, P'gh	80, 25, 10 and 2½
Stove bolts in bulk, Ch'go	80, 25, 10 and 2½
Stove bolts in bulk, Cleveland	80, 25, 10 and 2½
Tire bolts	60, 10 and 10

Discounts of 73, 10 and 10 per cent off on bolts and nuts apply on carload business with jobbers and large consumers.

Large Rivets

(½-in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	$2.25
F.o.b. Chicago	2.35

Small Rivets

(⅞-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70, 10 and 5
F.o.b. Cleveland	70, 10 and 5
F.o.b. Chicago	70, 10 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws	80, 10, 10 and 5
Milled standard set screws, case hardened	80 and 5
Milled headless set screws, cut thread	75 and 10
Upset hex. head cap screws, U.S.S.S. thread	85 and 10
Upset hex. cap screws, S.A.E. thread	85 and 10
Upset set screws	80, 10 and 5
Milled studs	70

SEMI-FINISHED STEEL

Billets and Blooms

	Per Gross Ton
Rerolling, 4-in. and under 10-in., Pittsburgh	$28.00
Rerolling, 4-in. and under 10-in., Youngstown	28.00
Rerolling, 4-in. and under 10-in., Cleveland	28.00
Rerolling, 4-in. and under 10-in., Chicago	29.00
Forging quality, Pittsburgh	35.00

Sheet Bars

(Open-Hearth or Bessemer)

	Per Gross Ton
Pittsburgh	$28.00
Youngstown	28.00
Cleveland	28.00

Slabs

(8 in. x 2 in. and under 10 in. x 10 in.)

	Per Gross Ton
Pittsburgh	$28.00
Youngstown	28.00
Cleveland	28.00

Skelp

(F.o.b. Pittsburgh or Youngstown)

	Per Lb.
Grooved	1.50c. to 1.60c.
Universal	1.50c. to 1.60c.
Sheared	1.50c. to 1.60c.

Wire Rods

(Common soft, base)

	Per Gross Ton
Pittsburgh	$37.00
Cleveland	37.00
Chicago	38.00

COKE, COAL AND FUEL OIL

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville prompt	$2.25 to $2.35
Foundry, f.o.b. Connellsville prompt	3.25 to 4.50
Foundry, by-product, Ch'go ovens	7.50
Foundry, by-product, New England, del'd	10.50
Foundry, by-product, Newark or Jersey City, delivered	8.70 to 9.10
Foundry, by-product, Phila.	$9.00
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry, by-product, del'd St. Louis	9.00

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	$1.40 to $1.50
Mine run coking coal, f.o.b. W. Pa.	1.50 to 1.60
Gas coal, ⅝-in., f.o.b. Pa. mines	$1.70 to $1.80
Mine run gas coal, f.o.b. Pa. mines	1.50 to 1.60
Steam slack, f.o.b. W. Pa. mines	0.50 to 0.60
Gas slack, f.o.b. W. Pa. mines	0.65 to 0.75

Fuel Oil

Per Gal. f.o.b. Bayonne, N. J.	
No. 3 distillate	3.50c.
No. 4 industrial	3.00c.
Per Gal. f.o.b. Baltimore	
No. 3 distillate	3.50c.
No. 4 industrial	3.25c.

FLUXES AND REFRACTORIES

Fluorspar

	Per Net Ton
Domestic, 85% and over calcium fluoride, not over 5% silicon, gravel, f.o.b. Illinois and Kentucky mines	$13.00
No. 2 lump, Illinois and Kentucky mines	17.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	17.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	32.00

Chrome Brick

	Per Net Ton
Standard size	$45.00

Fire Clay Brick

Per 1000 f.o.b. Works

	High-Heat Duty Brick	Intermediate Heavy Duty Brick
Pennsylvania	$40.00	$32.00 to $35.00
Maryland	40.00	32.00 to 35.00
New Jersey	$44.00 to 59.00	.....
Ohio	40.00	32.00 to 35.00
Kentucky	40.00	32.00 to 35.00
Missouri	37.00	32.00 to 35.00
Illinois	40.00	32.00 to 35.00
Ground fire clay, per ton	6.50	

Silica Brick

Per 1000 f.o.b. Works

Pennsylvania	$40.00
Chicago	49.00
Birmingham	50.00
Silica clay, per ton	8.00

Magnesite Brick

	Per Net Ton
Standard sizes, f.o.b. Baltimore and Chester, Pa.	$65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00

CAST IRON PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$40.40 to $41.40
4-in., del'd Chicago	43.40 to 44.40
6-in. and larger, del'd New York	$30.20
4-in., del'd New York	33.20
6-in. and larger, Birmingham	$32.00 to 33.00
4-in., Birmingham	$35.00 to $36.00

Class "A" and gas pipe, $3 extra.

Pig Iron Prices for All Districts

The freight rate advance, effective Jan. 4, increased pig iron tariffs 13.44c. per gross ton; for convenience the delivered prices in the following tables are figured on the basis of 13c. additional.

VALLEY

Per gross ton, f.o.b. Valley furnace:

Basic	$15.00
Bessemer	$16.00 to 16.50
Gray forge	15.50 to 16.00
No. 2 foundry	15.50 to 16.00
No. 3 foundry	15.00 to 15.50
Malleable	16.00 to 16.50
Low phos., copper free	26.89 to 27.00

Freight rate to Pittsburgh or Cleveland district, $1.89.

PITTSBURGH

Per gross ton, f.o.b. Pittsburgh district furnace:

Basic	$15.50
No. 2 foundry	$16.50 to 17.00
No. 3 foundry	16.00 to 16.50
Malleable	16.50 to 17.00
Bessemer	16.50 to 17.00

Freight rates to points in Pittsburgh district range from 69c. to $1.26.

CHICAGO

Per gross ton at Chicago furnace:

N'th'n No. 2 fdy.	$16.50
N'th'n No. 1 fdy.	17.00
Malleable, not over 2.25 sil.	16.50
High phosphorus	16.50
Lake Super. charcoal, sil. 1.50, by rail	23.17
Lake Super. charcoal, sil. 1.50, Chicago docks	17.00
S'th'n No. 2 fdy.	17.14
Low phos., sil. 1 to 2, copper free	$28.50 to 29.20
Silver, sil. 8 per cent	24.92
Bess. ferrosilicon, 14-15%	31.42

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b local furnaces, not including a switching charge.

ST. LOUIS

Per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill.	$17.50
Malleable, f.o.b. Granite City	17.50
N'th'n No. 2 fdy., del'd St. Louis	18.80
Southern No. 2 fdy., deliv'd	15.56
Northern malleable, deliv'd	18.80
Northern basic, deliv'd	18.80

Freight rates 83c. (average) Granite City to St. Louis; $2.30 from Chicago; $4.56 from Birmingham.

NEW YORK

Per gross ton, delivered New York district:

*Buffalo, No. 2, del'd east. N. J.	$17.91 to $18.41
East. Pa. No. 2 fdy.	17.02 to 17.52
East. Pa. No. 2X fdy.	17.52 to 18.02

Freight rates: $1.52 to $2.63 from eastern Pennsylvania.

*Prices delivered to New Jersey cities having rate of $3.41 a ton from Buffalo.

BUFFALO

Per gross ton, f.o.b. furnace:

No. 2 fdy.	$16.00
No. 2X fdy.	16.50
No. 1 fdy	17.50
Malleable, sil. up to 2.25	16.50
Basic	15.50
Lake Superior charcoal	23.41

NEW ENGLAND

Per gross ton delivered to most New England points:

*Buffalo, sil. 1.75 to 2.25	$20.04
*Buffalo, sil. 2.25 to 2.75	20.04
*Ala., sil. 1.75 to 2.25	$20.24 to 20.74
*Ala., sil. 2.25 to 2.75	20.74 to 21.24
†Ala., sil. 1.75 to 2.25	16.88
†Ala., sil. 2.25 to 2.75	17.38

Freight rates: $5.04 all rail; $9.74 all rail from Alabama and $5.88 rail and water from Alabama to New England seaboard.

*All rail rate.

†Rail and water rate.

CINCINNATI

Per gross ton, delivered Cincinnati:

Ala. fdy., sil. 1.75 to 2.25	$14.82
Ala. fdy., sil. 2.25 to 2.75	15.32
Tenn. fdy., sil. 1.75 to 2.25	14.82
N'th'n No. 2 foundry	18.02
S'th'n Ohio silvery, 8 per cent	22.01

Freight rates, $2.02 from Ironton and Jackson, Ohio; $3.81 from Birmingham.

PHILADELPHIA

Per gross ton at Philadelphia:

East. Pa. No. 2	$15.64 to $16.14
East. Pa. No. 2X	16.14 to 16.64
East. Pa. No. 1X	16.64 to 17.14
Basic (del'd east. Pa.)	16.25
Malleable	18.00 to 18.50
Stand. low phos. (f.o.b. east. Pa. furnace)	22.00 to 23.00
Cop. b'r'g low phos. (f.o.b. furnace)	22.00 to 22.50
Va. No. 2 plain	22.04
Va. No. 2X	22.54

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 84c. to $1.79 from eastern Pennsylvania furnaces; $4.67 from Virginia furnaces.

CLEVELAND

Per gross ton at Cleveland furnace:

N'th'n No. 2 fdy. (local delivery)	$16.00
S'th'n fdy., sil. 1.75 to 2.25	17.14
Malleable (local delivery)	16.00
Ohio silvery, 8 per cent	23.12
Stand. low phos., Valley	27.00

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: 55c. average local switching charge; $3.12 from Jackson, Ohio; $6.14 from Birmingham.

BIRMINGHAM

Per gross ton, f.o.b. Birmingham dist. furnaces:

No. 2 fdy., 1.75 to 2.25 sil.	$12.00
No. 1 fdy., 2.25 to 2.75 sil.	12.50
Basic	12.00

CANADA

Per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	$22.60
No. 2 fdy., sil. 1.75 to 2.25	22.10
Malleable	22.60
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	$24.00
No. 2 fdy., sil. 1.75 to 2.25	23.50
Malleable	24.00
Basic	$23.00 to 23.50

Prices of Ores and Ferroalloys

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range Bessemer, 51.50% iron	$4.80
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore

	Per Unit
Iron, low phos., copper free, 55 to 58% iron, dry, Spanish or Algerian	8c. to 8.50c.
Iron, low phos., Swedish, aver. 68% iron	9.00c.
Iron, basic or foundry, Swedish, average 65% iron	8.00c.
Iron, basic and foundry, Russian, aver. 63% iron (nom.)	9.00c.
Manganese, Caucasian, washed 52%	24.00c.
Manganese, African, Indian, 50-52%	23c. to 24c.
Manganese, Brazilian, 46 to 48%	22c. to 23c.
Tungsten, Chinese wolframite	$11.00 to $11.25
Tungsten, domestic scheelite	9.50 to 10.00

	Per Gross Ton
Chrome, 45% Cr_2O_3 crude, c.i.f. Atlantic seaboard	$18.00
Chrome, 48% Cr_2O_3, c.i.f. Atlantic seaboard	20.00

Ferromanganese

	Per Gross Ton
Domestic, 80%, seaboard	*$72.00 to $75.00
Foreign, 80%, Atlantic or Gulf port, duty paid	*72.00 to 75.00

*Minimum price quoted for lots of 2000 tons or more.

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$26.00 to $27.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50% (carloads)	$77.50
50% (less carload)	85.00
75%	126.00

Per Gross Ton Furnace		*Per Gross Ton Furnace*	
10%	$35.00	12%	$39.00
11%	37.00	14 to 16%	31.00

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		*Per Gross Ton*	
10%	$22.00	13%	$24.50
11%	22.50	14%	26.50
12%	23.50	15%	28.50

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		*Per Gross Ton*	
6%	$19.00	11%	$21.50
7%	19.50	12%	22.50
8%	20.00	13%	23.50
9%	20.50	14%	25.50
10%	21.00	15%	27.50

Other Ferroalloys

Ferrotungsten, per lb. wo. del., carloads	$1.08
Ferrotungsten, less carloads	$1.15 to 1.25
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	10.00c.
Ferrochromium, 2% carbon	17.00c. to 17.50c.
Ferrochromium, 1% carbon	19.00c. to 20.00c.
Ferrochromium, 0.10% carbon	23.50c. to 25.00c.
Ferrochromium, 0.06% carbon	25.50c. to 27.00c.
Ferrovanadium, del., per lb. contained Va.	$3.05 to $3.30
Ferrocarbontitanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads	160.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base per gross ton	91.00
Ferromolybdenum, per lb. Mo., del.	1.00
Calcium molybdate, per lb. Mo., del.	85c.
Ferrophosphorus, electric, 24% f.o.b. Anniston, Ala., per gross ton	$122.50
Silico spiegel, per ton, f.o.b. furnace, car lots	42.50
Ton lots or less, per ton	47.50
Silico-manganese, gross ton, delivered: 2.50% carbon grade	105.00
1% carbon grade	115.00
Spot prices	$5 a ton higher

Old Material Quotations

PITTSBURGH

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$10.00 to	$10.25
No. 2 heavy melting steel	9.00 to	9.50
No. 2 railroad wrought	10.00 to	10.50
Scrap rails	10.00 to	10.50
Rails 3 ft. and under	12.00 to	12.50
Sheet bar crops, ordinary	11.00 to	11.50
Compressed sheet steel	9.75 to	10.25
Hand bundled sheet steel	9.00 to	9.50
Hvy. steel axle turnings	9.00 to	9.50
Machine shop turnings	6.50 to	7.00
Short shov. steel turnings	6.50 to	7.00
Short mixed borings and turnings	6.50 to	7.00
Cast iron borings	6.50 to	7.00
Cast iron carwheels	10.50 to	11.00
Heavy breakable cast	8.00 to	8.50
No. 1 cast	9.50 to	10.50
Railr. knuckles and couplers	10.50 to	11.50
Rail. coil and leaf springs	10.50 to	11.50
Rolled steel wheels	10.50 to	11.50
Low phos. billet crops	13.00 to	13.50
Low phos. sheet bar crops	12.50 to	13.00
Low phos. plate scrap	10.00 to	11.50
Low phos. punchings	11.00 to	12.00
Steel car axles	15.00 to	15.50

CHICAGO

Delivered Chicago district consumers:

Per Gross Ton

Heavy melting steel	$7.50 to	$8.00
Shoveling steel	7.50 to	8.00
Frogs, switches and guards	7.50 to	8.00
Hydraulic comp. sheets	5.75 to	6.25
Drop forge flashings	5.00 to	5.50
No. 1 busheling	5.50 to	6.00
Rolled carwheels	8.00 to	9.00
Railroad tires	9.00 to	9.50
Railroad leaf springs	8.50 to	9.00
Axle turnings	5.75 to	6.25
Steel couplers and knuckles	8.25 to	8.75
Coil springs	9.50 to	10.00
Axle turnings (elec. fur.)	6.00 to	6.50
Low phos. punchings	10.00 to	10.50
Low phos. plates, 12 in. and under	9.00 to	9.50
Cast iron borings	3.50 to	4.00
Short shoveling turnings	4.00 to	4.50
Machine shop turnings	4.00 to	4.50
Rerolling rails	10.50 to	11.00
Steel rails, less than 3 ft.	9.25 to	9.75
Steel rails, less than 2 ft.	10.00 to	10.50
Angle bars, steel	8.25 to	8.75
Cast iron carwheels	8.50 to	9.00
Railroad malleable	7.00 to	7.50
Agricultural malleable	7.00 to	7.50
*Relaying rails, 56 to 60 lb.	19.00 to	21.00
*Relay. rails, 65 lb. and up	22.00 to	27.00

Per Net Ton

Iron angle and splice bars	7.00 to	7.50
Iron arch bars, transoms	7.50 to	8.00
Iron car axles	13.50 to	14.50
Steel car axles	10.50 to	11.00
No. 1 railroad wrought	6.50 to	7.00
No. 2 railroad wrought	6.50 to	7.00
No. 1 busheling	5.00 to	5.50
No. 2 busheling	2.50 to	3.00
Locomotive tires, smooth	8.00 to	9.00
Pipes and flues	3.25 to	3.75
No. 1 machinery cast	8.50 to	9.00
Clean automobile cast	7.50 to	8.00
No. 1 railroad cast	7.00 to	7.50
No. 1 agricultural cast	7.00 to	7.50
Stove plate	6.25 to	6.75
Grate bars	5.50 to	6.00
Brake shoes	5.75 to	6.25

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

PHILADELPHIA

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$7.00 to	$8.00
No. 2 heavy melting stel	6.00 to	6.50
No. 1 railroad wrought	9.50 to	10.00
Bundled sheets		6.00
Hydraulic compressed, new	7.00 to	7.50
Hydraulic compressed, old	6.00 to	6.50
Machine shop turnings		4.50
Heavy axle turnings	7.00 to	8.00
Cast borings (nom.)		3.50
Heavy breakable cast		9.00
Stove plate (steel works)		7.00
No. 1 low phos. hvy	11.00 to	12.00
Couplers and knuckles	10.00 to	10.50
Rolled steel wheels	9.50 to	10.00
No. 1 blast furnace		3.50
Spec. iron and steel pipe		10.50
Shafting	15.00 to	15.50
Steel axles	15.00 to	15.50
No. 1 forge fire	6.75 to	7.25
Cast iron carwheels	11.50 to	12.00
No. 1 cast	10.00 to	10.50
Cast borings (chem.)	11.50 to	12.00
Steel rails for rolling		10.50

CLEVELAND

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$7.50 to	$8.00
No. 2 heavy melting steel	6.75 to	7.25
Compressed sheet steel	7.00 to	7.25
Light bundled sheet stampings	6.00 to	6.50
Drop forge flashings	6.00 to	6.25
Machine-shop turnings	4.50 to	4.75
Short shoveling turnings	5.75 to	6.25
No. 1 busheling	6.50 to	6.75
Steel axle turnings	7.50 to	8.00
Low phos., billet crops	14.00 to	14.50
Cast iron borings	4.50 to	4.75
Mixed borings and short turnings	4.50 to	4.75
No. 2 busheling	4.50 to	4.75
No. 1 cast	9.00 to	9.50
Railroad grate bars	6.00 to	6.50
Stove plate	6.00 to	6.50
Rails under 3 ft.	15.00 to	15.50
Rails for rolling	13.00 to	13.50
Railroad malleable	11.00 to	11.25

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:

No. 1 heavy melting steel		$8.00
No. 2 heavy melting scrap	6.50 to	7.50
Scrap rails	8.00 to	8.50
New hydraul. comp. sheets		6.50
Old hydraul. comp. sheets		5.50
Drop forge flashings		6.50
No. 1 busheling	6.50 to	7.00
Hvy. steel axle turnings	8.00 to	8.50
Machine shop turnings	4.50 to	5.00
Knuckles and couplers		10.00
Coil and leaf springs		10.00
Rolled steel wheels		10.00
Low phos. billet crops	12.50 to	13.00
Short shov. steel turnings	7.00 to	7.50
Short mixed borings and turnings	6.00 to	6.50
Cast iron borings	6.00 to	6.50
No. 2 busheling	4.50 to	5.00
Steel car axles	10.00 to	11.00
Iron axles	12.00 to	12.50
No. 1 machinery cast	10.00 to	10.50
Stove plate	8.25 to	8.50
Steel rails, 3 ft. and under	12.00 to	12.50
Cast iron carwheels	9.00 to	9.50
Industrial malleable	9.50 to	10.00
Railroad malleable	9.50 to	10.00
Chemical borings	9.00 to	9.50

BIRMINGHAM

Per gross ton delivered consumers' yards:

Heavy melting steel	$8.50 to	$9.00
Scrap steel rails		9.00
Short shoveling turnings	3.50 to	4.00
Stove plates		6.00
Steel axles		12.00
Iron axles		12.00
No. 1 railroad wrought		6.00
Rails for rolling	9.00 to	9.50
No. 1 cast		9.00
Tramcar wheels	9.00 to	10.00
Cast iron borings, chem	10.00 to	11.00

ST. LOUIS

Dealers' buying prices per gross ton:

Selected heavy steel	$7.00 to	$7.50
No. 1 heavy melting	6.50 to	7.00
No. 2 heavy melting	6.25 to	6.75
No. 1 locomotive tires	8.00 to	8.50
Misc. stand-sec. rails	7.75 to	8.25
Railroad springs	8.50 to	9.00
Bundled sheets	4.25 to	4.75
No. 2 railroad wrought	6.25 to	6.75
No. 1 busheling	6.00 to	6.50
Cast iron borings and shoveling turnings	4.75 to	5.25
Iron rails	7.00 to	8.00
Rails for rolling	9.50 to	10.00
Machine shop turnings	3.00 to	3.50
Heavy turnings	5.50 to	6.00
Steel car axles	10.00 to	10.50
Iron car axles	14.00 to	14.50
Wrot. iron bars and trans.	5.00 to	5.50
No. 1 railroad wrought	4.75 to	5.25
Steel rails, less than 3 ft.	10.00 to	10.50
Steel angle bars	6.75 to	7.25
Cast iron carwheels	6.50 to	7.00
No. 1 machinery cast	8.00 to	8.50
Railroad malleable	5.00 to	5.50
No. 1 railroad cast	6.25 to	6.75
Stove plate	6.00 to	6.50
Relay. rails, 60 lb. and under	16.00 to	16.50
Relay. rails, 70 lb. and over	20.00 to	21.00
Agricult. malleable	5.00 to	5.50

NEW YORK

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	$4.25 to	$5.50
Heavy melting steel (yard)	2.75 to	3.00
No. 1 hvy. breakable cast	5.00 to	5.50
Stove plate (steel works)	3.00 to	3.50
Machine shop turnings	1.75 to	2.00
Short shoveling turnings	1.75 to	2.00
Cast borings	1.25 to	1.50
No. 1 blast furnace	1.25 to	1.50
Steel car axles	10.00 to	10.50
Iron car axles (nom.)	14.00 to	14.50
Spec. iron and steel pipe		5.00
Forge fire		3.25
No. 1 railroad wrought	5.00 to	5.25
No. 1 yard wrought, long	4.00 to	4.25
Rails for rolling	6.00 to	6.25
Stove plate (foundry)	4.75 to	5.25
Malleable cast (railroad)	6.00 to	6.50
Cast borings (chemical)	8.00 to	8.50

Per gross ton, delivered local foundries:

No. 1 machinery cast	$8.50
No. 1 hvy. cast (cupola size)	6.50
No. 2 cast	5.50

BOSTON

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	$3.80 to	$4.60
Scrap T rails	3.80 to	4.60
Machine shop turnings		1.05
Cast iron borings		1.05
Bundled skeleton, long	3.00 to	3.25
Forge flashings	3.00 to	3.50
Blast furnace scrap		1.05
Forge scrap	3.00 to	3.25
Shafting	9.50 to	10.00
Steel car axles	9.00 to	9.50
Wrought pipe	4.00 to	4.25
Rails for rolling	6.00 to	6.50
Cast iron borings, chemical	7.00 to	7.25

Per gross ton delivered consumers' yards:

Textile cast	$8.75 to	$9.25
No. 1 machinery cast	8.75 to	9.25
Stove plate	5.00 to	5.25
Railroad malleable	10.50 to	11.00

CINCINNATI

Dealers' buying prices per gross ton:

Heavy melting steel	$6.00 to	$7.00
Scrap rails for melting	8.00 to	8.50
Loose sheet clippings	2.75 to	3.25
Bundled sheets	4.75 to	5.25
Cast iron borings	2.75 to	3.25
Machine shop turnings	3.25 to	3.75
No. 1 busheling	4.25 to	4.75
No. 2 busheling	2.50 to	3.00
Rails for rolling	9.00 to	9.50
No. 1 locomotive tires	8.50 to	9.00
Short rails	11.75 to	12.25
Cast iron carwheels	8.25 to	8.75
No. 1 machinery cast	10.00 to	10.50
No. 1 railroad cast	8.75 to	9.25
Burnt cast	4.25 to	4.75
Stove plate	4.25 to	4.75
Agricultural malleable	8.00 to	8.50
Railroad malleable	9.00 to	9.50

DETROIT

Dealers' buying prices per gross ton:

Hvy. melting	$5.50 to	$6.00
Borings and short turnings	3.00 to	3.50
Long turnings	2.75 to	3.25
No. 1 machinery cast	8.50 to	9.00
Automotive cast	10.75 to	11.25
Hydraul. comp. sheets	5.25 to	5.75
Stove plate	4.50 to	5.00
New No. 1 busheling	4.25 to	4.75
Old No. 2 busheling	3.00 to	3.50
Sheet clippings	3.00 to	3.50
Flashings	4.75 to	5.25

CANADA

Dealers' buying prices per gross ton:

	Toronto	Montreal
Heavy melting steel	$7.00	$6.00
Rails, scrap	7.00	6.00
No. 1 wrought	6.00	8.00
Machine shop turnings	2.00	2.00
Boiler plate	5.00	4.50
Heavy axle turnings	2.50	2.50
Cast borings	2.00	2.00
Steel borings	2.00	2.00
Wrought pipe	2.00	2.00
Steel axles	7.00	9.00
Axles, wrought iron	7.00	11.00
No. 1 machinery cast	12.50	10 00
Stove plate	10.00	8.00
Standard carwheels	11.00	8 50
Malleable	10.00	8.00

Warehouse Prices for Iron and Steel Products

CHICAGO

	Base per Lb.
Plates and structural shapes	3.00c.
Soft steel bars	2.75c.
Reinforcing bars, billet steel	1.75c.
Rail steel reinforcement—	
For buildings	1.55c.
Road slabs, bridges, culverts	1.40c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons	3.10c.
Flats and squares	3.60c.
Bands, ⅞ in. (in. Nos. 10 and 12 gages)	2.95c.
Hoops (No. 14 gage and lighter)	3.50c.
Hot-rolled annealed sheets (No. 24)	3.55c.
Galv. sheets (No. 24)	4.10c.
Hot-rolled sheets (No. 10)	3.20c.
Spikes (⅞ in. and lighter)	3.45c.
Track bolts	4.30c.
Rivets, structural	4.00c.
Rivets, boiler	4.00c.

	Per Cent Off List
Machine bolts	73
Carriage bolts	73
Coach and lag screws	73
Hot-pressed nuts, sq., tap. or blank	73
Hot-pressed nuts, hex., tap. or blank	73
No. 8 black ann'l'd wire, per 100 lb.	$3.45
Com. wire nails, base per keg	2.30
Cement c't'd nails, base per keg	2.30

CLEVELAND

	Base per Lb.
Plates and struc. shapes	2.95c.
Soft steel bars	2.75c.
Reinforc. steel bars	1.75c. to 1.95c.
Cold-fin. rounds and hex	3.10c.
Cold-fin. flats and sq	3.60c.
Hoops and bands, No. 12 to ⅞ in., inclusive	3.00c.
Hoops and bands, No. 13 and lighter	3.55c.
Cold-finished strip	*5.55c.
Hot-rolled annealed sheets (No. 24)	3.60c.
Galvanized sheets (No. 24)	3.75c.
Hot-rolled sheets (No. 10)	3.00c.
No. 9 ann'l'd wire, per 100 lb	$2.25
No. 9 galv. wire, per 100 lb	2.70
Com. wire nails, base per keg	2.25

*Net base, including boxing and cutting to length.

CINCINNATI

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.00c.
New billet reinforc. bars	3.00c.
Rail steel reinforc. bars	3.00c.
Hoops	3.90c.
Bands	3.20c.
Cold-fin. rounds and hex	3.50c.
Squares	4.00c.
Hot-rolled annealed sheets (No. 24)	3.75c.
Galv. sheets (No. 24)	4.25c.
Hot-rolled sheets (No. 10)	3.30c.
Structural rivets	4.20c.
Small rivets	60 per cent off list
No. 9 ann'l'd wire, per 100 lb	$3.00
Com. wire nails, base per keg (10 to 49 kegs)	2.65
Larger quantities	2.50
Cement c't'd nails, base 100-lb. keg	2.95
Chain, per 100 lb	10.25

	Net per 100 Ft.
Seamless steel boiler tubes, 2-in.	$17.50
4-in.	36.00
Lap-welded steel boiler tubes, 2-in.	16.50
4-in.	34.50

BUFFALO

	Base per Lb.
Plates and struc. shapes	3.25c.
Soft steel bars	3.00c.
Reinforcing bars	2.65c.
Cold-fin. flats and sq	3.65c.
Rounds and hex	3.15c.
Cold-rolled strip steel	5.25c.
Hot-rolled annealed sheets (No. 24)	3.70c.
Galv. sheets (No. 24)	4.10c.
Bands	3.35c.
Hoops	3.90c.
Hot-rolled sheets (No. 10)	3.50c.
Com. wire nails, base per keg	$2.45
Black wire, base per 100 lb	3.20

NEW YORK

	Base per Lb.
Plates and struc. shapes	2.70c. to 3.10c.
Soft steel bars, small shapes	2.70c. to 3.10c.
Iron bars	3.24c.
Iron bars, Swed. charcoal	7.00c. to 7.25c.
Cold-fin shafting and screw stock:	
Rounds and hexagons	3.40c.
Flats and squares	3.90c.
Cold-roll. strip, soft and quarter hard	4.95c.
Hoops	3.75c.
Bands	3.40c.
Hot-rolled sheets (No. 10)	3.00c. to 3.25c.
Hot-rolled ann'l'd sheets (No. 24*)	3.60c.
Galvanized sheets (No. 24*)	4.00c.
Long terne sheets (No. 24)	5.00c.
Standard tool steel	12.00c.
Wire, black annealed (No. 10)	3.60c.
Wire, galv. annealed (No. 10)	4.05c.
Common wire nails, base, per keg	$2.50
Tire steel, ½ x ½ in. and larger	3.40c.
Smooth finish, 1 to 2½ x ¼ in. and larger	3.75c.
Open-hearth spring steel, bases	4.50c. to 7.00c.

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

	Per Cent Off List
Machine bolts, cut thread:	
¾ x 6 in. and smaller	65 to 65 and 10
1 x 30 in. and smaller	65 to 65 and 10
Carriage bolts, cut thread:	
½ x 6 in. and smaller	65 to 65 and 10
¾ x 20 in. and smaller	65 to 65 and 10

	Per 100 Ft.
Boiler Tubes:	
Lap welded, 2-in.	$19.00
Seamless steel, 2-in.	20.25
Charcoal iron, 2-in.	26.25
Charcoal iron, 4-in.	67.00

ST. LOUIS

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.00c.
Cold-fin. rounds, shafting, screw stock	3.35c.
Hot-rolled annealed sheets (No. 24)	3.80c.
Galv. sheets (No. 24)	4.35c.
Hot-rolled sheets (No. 10)	3.45c.
Black corrug. sheets (No. 24)	3.85c.
Galv. corrug. sheets	4.40c.
Structural rivets	4.00c.
Boiler rivets	4.00c.

	Per Cent Off List
Tank rivets, ⅞-in. and smaller, 100 lb. or more	65
Less than 100 lb	60
Machine bolts	73
Carriage bolts	73
Lag screws	73
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more	73
Less than 200 lb	63
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more	73
Less than 200 lb	63

PACIFIC COAST

	Base per Lb.		
	San Francisco	Los Angeles	Seattle
Plates and struc. shapes, ¼-in. and heavier	2.80c.	3.00c.	2.50c.
Soft steel bars	2.80c.	3.00c.	2.50c.
Reinforcing bars	2.80c.	2.80c.	3.00c.
Hot-rolled annealed sheets (No. 24)	3.90c.	4.00c.	4.00c.
Hot-rolled sheets (No. 10)	3.40c.	3.50c.	3.50c.
Galv. sheets (No. 24)	4.40c.	4.20c.	4.50c.
Struc. rivets, ½ in. and larger, less than 1000 lb	5.00c.	5.00c.	5.50c.
Cold-finished steel bars and shafting:			
Rounds	5.25c.		
Square and hexagon	6.25c.		
Flats	6.75c.		
Common wire nails, base per keg in less carloads	$2.75	$2.75	$2.75

Plates, shapes, bars, bands and hot-rolled sheets, No. 16 gage and heavier, subject to group differentials.

Cold-finished steel bars and shafting, subject to warehouse differentials for quantity.

PITTSBURGH

	*Base per Lb.
Plates	2.85c.
Structural shapes	2.85c.
Soft steel bars and small shapes	2.60c.
Reinforcing steel bars	2.60c.
Cold-finished and screw stock—	
Rounds and hexagons	3.10c.
Squares and flats	3.60c.
Bands	2.95c.
Hoops	3.60c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles	3.05c.
Galv. sheets (No. 24), 25 or more bundles	3.65c.
Hot-rolled sheets (No. 10)	3.15c. to 3.20c.
Galv. corrug. sheets (No. 28), per square (less than 3750 lb.)	3.74c.
Spikes, large	2.50c.
Small	2.75c. to 2.90c.
Boat	3.00c.
Track bolts, all sizes, per 100 count,	70 and 10 per cent off list
Machine bolts, 100 count,	70 and 10 per cent off list
Carriage bolts, 100 count,	70 and 10 per cent off list
Nuts, all styles, 100 count,	70 and 10 per cent off list
Large rivets, base per 100 lb	$3.00
Wire, black, soft ann'l'd, base per 100 lb.	2.30
Wire, galv. soft, base per 100 lb	2.75
Common wire nails, per keg	2.25
Cement coated nails, per keg	2.25

*On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 999 lb.

PHILADELPHIA

	Base per Lb.
Plates, ¼-in. and heavier	2.50c.
Structural shapes	2.50c.
Soft steel bars, small shapes, iron bars (except bands)	2.60c.
Reinforc. steel bars, sq., twisted and deform	2.30c.
Cold-fin. steel, rounds and hex	3.30c.
Cold-fin. steel, sq. and flats	3.80c.
Steel hoops	3.15c.
Steel bands, No. 12 to ⅞-in., inclu.	2.90c.
Spring steel	5.00c.
Hot-rolled box annealed sheets (No. 24)	3.55c.
Galvanized sheets (No. 24)	4.00c.
Hot-rolled blue annealed sheets (No. 10)	3.05c.
Diam. pat. floor plates, ¼ in.	5.10c.
Swedish iron bars	6.60c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

BOSTON

	Base per Lb.
Plates	*3.35c.
Structural shapes	*3.35c.
Soft steel bars, small shapes	*3.25c.
Reinforcing bars	3.10c. to 3.25c.
Iron bars—	
Refined	3.25c.
Best refined	4.60c.
Spring steel, open-hearth	5.00c.
Tire steel	4.50c. to 4.75c.
Bands	*3.75c. to 4.25c.
Hoop steel	4.90c. to 5.40c.
Cold-rolled steel—	
Rounds and hex	3.50c. to 5.50c.
Squares and flats	4.00c. to 6.00c.
Rivets, structural or boiler	4.80c.

	Per Cent Off List
Machine bolts	70
Carriage bolts	70
Lag screws	70
Hot-pressed nuts	40 and 10
Cold-punched nuts	40 and 10
Stove bolts	70 and 10

*Base price (250 to 999 lb.); less than 250 lb., add 50c. per 100 lb.; 1000 to 7999 lb., deduct 15c.; 8000 to 14,999 lb., deduct 25c.; 15,000 lb. and larger lots, deduct 35c.

Fabricated Structural Steel

Awards of 6000 Tons Include 1500 Tons of Tunnel Lining at Hoover Dam—Projects Only 610 Tons

AWARDS of fabricated structural steel of 6000 tons is the lowest recorded total. Included are 1500 tons of tunnel lining forms for the Hoover Dam in Arizona, 400 tons for a State hospital at Kings Park, N. Y., and 650 tons for a hall of records at Martinez, Cal. New projects total only 610 tons. Awards follow:

NORTH ATLANTIC STATES

Kings Park, N. Y., 400 tons, State Hospital building, to Lehigh Structural Steel Co.

Brooklyn, 425 tons, pier shed, foot of Cranberry Street, to Fort Pitt Bridge Works Co.

Pennsylvania Railroad, 230 tons, consolidated terminal at Newark, N. J., to American Bridge Co.; J. Rich Steers, Inc., general contractor.

Manasquan, N. J., 100 tons, State highway grade crossing elimination, to Seacoast Iron Works, Inc., Asbury Park, N. J.

Wrentham, Mass., 130 tons, State hospital unit, to Palmer Steel Co.

Elkton, Md., 610 tons, Big Elk Creek bridge, to McClintic-Marshall Corpn.

Lancaster County, Pa., 215 tons, two highway bridges, to McClintic-Marshall Corpn.

THE SOUTH

State of Georgia, 725 tons, State highway work; 190 tons to McClintic-Marshall Corpn., 535 tons to Virginia Bridge & Iron Co.

Charlottesville, Va., 385 tons, building for Charlottesville Woolen Mills, to Virginia Bridge & Iron Co.

CENTRAL STATES

Hinsdale, Ill., 330 tons, King Bruwaert Home, to Hansell-Elcock Co.

WESTERN STATES

Sacramento, Cal., 158 tons, filtration plant, to Palm Iron Works.

Los Angeles, 385 tons, Southern California Telephone Co. building, to McClintic-Marshall Corpn.

Hoover Dam, Ariz., 1500 tons, tunnel lining forms, to Consolidated Steel Co.

Pasadena, Cal., 100 tons, Order of Eastern Star Home for Aged, to Soule Steel Co.

Martinez, Cal., 650 tons, County Hall of Records, to Golden Gate Iron Works.

NEW STRUCTURAL PROJECTS

CENTRAL STATES

Rockford, Ill., 500 tons, post office; bids Jan. 6.

WESTERN STATES

Clark County, Nev., 110 tons, Muddy River State highway bridge.

FABRICATED PLATE

AWARDS

Long Beach, Cal., 100 tons, tanks for Field Chemical Co., to McClintic-Marshall Corpn.

Hoover Dam, Ariz., 300 tons, tunnel lining, to Consolidated Steel Co.

NEW PROJECTS

Los Angeles, 100 tons, 45 and 30-in. pipe.

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Reinforcing Steel

Awards 3945 Tons—New Projects 3500 Tons

AWARDS

New York, 450 tons, First National Bank building, to Concrete Steel Co.

Kings Park, N. Y., 250 tons, State Hospital building, to Igoe Brothers, Newark, N. J.

Boston, 100 tons, school, to Barker Steel Co.

Lima, Ohio, 230 tons, Lima Hospital, to Hausman Steel Co., Toledo.

Hinsdale, Ill., 200 tons, Spinsters' Home to Concrete Engineering Co.

State of Illinois, 300 tons; paving, 100 tons to Concrete Engineering Co., 200 tons divided among several bidders.

Sacramento, 700 tons, filtration plant, to Concrete Engineering Co.; previously reported to Northwestern Steel Rolling Mills.

Seattle, 100 tons, Lynn Street viaduct, to Northwestern Steel Rolling Mills.

Berkeley, Cal., 362 tons, University of California men's gymnasium, to Pacific Coast Steel Co.

Oahu, Hawaii, 1500 tons, naval ammunition depot, to Jones & Laughlin Steel Corpn.

Pasadena, Cal., 150 tons, Order of Eastern Star Home for Aged, to an unnamed bidder.

Los Angeles, 150 tons, Southern California Telephone Co. building, to an unnamed bidder.

Santa Barbara, 150 tons, Christian Science church, to an unnamed bidder.

NEW REINFORCING BAR PROJECTS

Boston, 1500 tons, Christian Science publishing plant.

Cambridge, Mass., 800 tons, Ringe school.

Melrose, Mass., 200 tons, school.

Chicago, 800 tons, sewer project, to be readvertised by Sanitary District Trustees.

Manteno, Ill., 200 tons, State buildings; Machuda Brothers & Chris Hanson, low bidders.

San Jose, Cal., 300 tons, science building at State Teachers College.

San Diego, Cal., 100 tons, garage for Southern California Telephone Co.

Mare Island, Cal., 137 tons, battery building for Navy Yard.

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Cast Iron Pipe

Boston Metropolitan Sewerage Commission awarded 600 tons of 30 and 42-in. to Warren Foundry & Pipe Corpn.

Providence, R. I., awarded 800 tons of 4, 8 and 24-in. to R. D. Wood & Co.

Beverly Hills, Cal., awarded 200 tons of 16-in. to United States Pipe & Foundry Co.

Pasco, Wash., awarded 100 tons of 6 and 10-in. to American Cast Iron Pipe Co.

Boston opened bids on 2050 tons of 4 to 16-in., on which United States Pipe & Foundry Co. is low bidder.

Brooklyn Union Gas Co., Brooklyn, is inquiring for 1125 tons of 6-in.

Public Service Electric & Gas Co., New Jersey, is in the market for 250 tons of 8-in.

Whittier, Cal., opened bids Jan. 4 on 200 tons of 4 and 6-in. Class B.

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Indian Company Inquires for Steel Rolling Mills

HAMBURG, GERMANY, Dec. 23.—The Mysore Iron Works, Bhadravati, India, which is planning to construct a steel works (reported in THE IRON AGE, Dec. 24) has started negotiations with German companies for steel rolling mill equipment. Preliminary plans call for an annual production of 25,000 to 30,000 tons of bars and shapes. The pipe plant at the Mysore Iron Works was furnished with German equipment about two years ago.

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German Machine Exports Exceed Domestic Orders

HAMBURG, GERMANY, Dec. 23.—The German Federation of Machinery Manufacturers reports that in November 65 per cent of all orders were for export. While export demand is now declining, the recent emergency decree of the Government, reducing prices generally, is bringing out some domestic business, which had been withheld in anticipation of this reduction.

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Steel Railroad Ties Used in South Africa

When the first railroads were built in the Union of South Africa, says a report to the Department of Commerce from the trade commissioner in Johannesburg, the absence of large quantities of merchantable timber, which might be converted into ties, encouraged the introduction of the steel tie, and since then the railway administration has continued its study of such equipment.

Recent statistics on the South African Railways show 12,873 miles of line in operation, of which about 3000 miles is laid with steel ties, including main lines, branches and sidings. These ties are placed inland to within about 10 miles of the seacoast, because of the possibility of corrosion in the salt air.

In the latest period for which statistics are available, the fiscal year ended March 31, 1930, the South African Railways bought an aggregate of 2,209,696 steel ties, of which 726,664 were for 80-lb. main line rails. The policy of the engineering department appears to be to use steel ties for replacement work.

Steel ties have been purchased in the past from European mills, chiefly in England, Belgium and Germany. However, with the new Government steel works operating at Pretoria, the South African Union will produce its own ties. Steel ties on African railroad lines date back to 1895 and 1896. These old ties were spaced 1936 to the mile and chiefly packed with sand. They have withstood the increasing strain of greater weight and speed of trains for 36 years and some are still serviceable where traffic is lighter. Most of the ties are relatively free from rust, testimony to the quality of material used in their manufacture.

December Automobile Output Estimated at 110,000 Units

Forecast for January Is 125,000 to 150,000—Ford Not Expected to Attain Volume Production Until February

DETROIT, Jan. 5.—Revised estimates put December motor car production in the United States and Canada at about 110,000 cars. With operations in the automotive industry slowly expanding, output this month should be 125,000 to 150,000 units, with a strong possibility that it will be nearer the latter figure.

Unless there is an unexpected turn for the better, it is likely that the manufacture of motor cars will increase at a low rate during the first quarter, with total assemblies for January, February and March running between 500,000 and 550,000 cars, against 697,449 in the same period of last year and 1,096,689 in 1930.

This forecast is based on extremely conservative factory schedules and is subject to upward revision in case the Ford Motor Co. should get into heavy production on its eight-cylinder car earlier than present signs indicate. The position of Ford suppliers is much the same as in recent weeks, except that some companies have received shipping releases for relatively small lots of parts. While preparations for the new car are being pushed as rapidly as possible at the Rouge plant, production on a volume basis seems difficult of attainment until some time in February.

Chevrolet's output last month was above the 37,000 units which the company earlier had planned.

Buick shipped 11,629 cars in December, compared with 9053 in November and 4022 in December, 1930. Studebaker and its subsidiaries, Pierce-Arrow and Rockne, produced 6237 cars last month, or double the number a year ago. During the entire year 1931 Hupmobile turned out 17,450 cars, and Reo 14,021.

Pig iron shipments during December to automotive consumers were about 25 per cent greater than in November.

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Unemployment in Europe Continues to Increase

(*By Cable*)

LONDON, ENGLAND, Jan. 4.—Business is extremely quiet and many mills have not resumed since the holidays. Blast furnaces expect domestic contracts to be renewed for this year, but export sales are negligible and stocks large.

Canadian buyers are still active, but other markets are depressed by the financial situation. Continental conditions are worse and, with unemployment increasing in France, competition with Belgian mills is keen.

Continental sellers of semi-finished steel are restricting sales until after a meeting in Paris, Jan. 12, to discuss organization of a central selling office. The International Rail Makers' Association will meet in London, Jan. 15, to consider invoicing questions.

Inquiry for Welsh tin plate is good and makers are optimistic. Fair orders have been booked from Canada and business is expected soon from Australia and Japan. Recent inquiries from Eastern oil companies totaled about 8000 base boxes, most of which have been placed.

Certain tin plate mills are in need of tonnage so that some prompt shipment tin plate is available at low prices, although the market in general is strong. Negotiations are proceeding for renewal of the Welsh tin plate conference. A leading maker of terne plate is now specializing in tin plate.

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Pickands, Mather & Co. and Pickands, Brown Join

Pickands, Mather & Co., Cleveland, have acquired the pig iron and coke sales business of Pickands, Brown & Co., Chicago, and have admitted to partnership in the firm four executives of the Chicago company. The new partners are C. P. Wheeler, president, and one of the early partners of Pickands, Brown & Co.; Seymour Wheeler, who served as vice-president in charge of pig iron sales; Donald Boynton, vice-president in charge of coke sales, and Clifford D. Caldwell, president, Interlake Iron Corpn., and a formed president of Pickands, Brown & Co.

The consolidation reunites two firms which were associated a generation ago and which have been closely affiliated for nearly half a century. In 1883, Pickands, Mather & Co. was organized by Samuel Mather, Col. James Pickands and Jay C. Morse and later in the same year this new firm joined with H. S. Pickands, brother of James Pickands, and W. L. Brown in the formation of Pickands, Brown & Co. The Pickands, Mather interest in Pickands, Brown & Co. was retained until about 1900, when it was purchased by W. L. Brown, H. S. Pickands and C. P. Wheeler. Later C. T. Boynton joined the firm. In 1903, Pickands, Brown & Co. was incorporated and later C. D. Caldwell became an officer. In 1905 this company, with Pickands, Mather & Co. and the National Malleable Castings Co., formed the Federal Furnace Co., which later merged with the By-Products Coke Corpn., which later formed the nucleus of the Interlake Iron Corpn., organized in 1929.

Since the formation of the Interlake Iron Corpn., Pickands, Brown & Co. have been sales agents for the Zenith furnace, Duluth, and the Federal furnaces at Chicago of that corporation, while Pickands, Mather & Co. have handled the sales for the Perry furnace at Erie, Pa., and the Toledo furnaces at Toledo, Ohio. With the consolidation, the sales of the units of the Interlake Iron Corpn. will be under a single direction. Pickands, Mather & Co. will also be merchant pig iron sales agents for the Youngstown Sheet & Tube Co. in Chicago and coke sales agents for the Milwaukee Coke & Gas Co. and for the North Shore Coke & Chemical Co., Chicago.

Membership in the partnership of Pickands, Mather & Co. has been increased to eight by the addition of the four Chicago members. The Cleveland members are H. G. Dalton, Elton Hoyt, 2nd, Frank Armstrong and S. E. Bool.

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Machinery Exports at 15-Year Low in November

WASHINGTON, Jan. 4. — Continuing their downward tendency, exports of machinery in November totaled $14,657,480, compared with $20,184,000 in October. The November total was the smallest for any month since February, 1916. In the first 11 months they amounted to $300,597,069, against $481,902,236 in the like period of 1930. The 11-month total was the lowest since 1924, but was practically the same as in 1925.

Exports of industrial machinery in November were $7,041,260, a drop of $949,000 from October. In the first 11 months they aggregated $133,395,157, compared with $212,691,321 in the same period of 1930.

Despite the drop of 37½ per cent in total machinery exports in 11 months, machine tools in that period held within 3 per cent of the 1930 volume.

Imports of machinery, as listed in THE IRON AGE, were valued at $801,220 in November, against $916,023 in October. In the first 11 months they totaled $11,902,994, against $21,874,673 in the like period of 1930.

Iron and Steel Prices for Seventeen Years

Monthly Averages Computed from the Weekly Market Quotations of THE IRON AGE in the Period of 1915 to 1931

IN this issue of THE IRON AGE are our two colored price charts, in which plotted lines indicate the course of prices for pig iron, billets, scrap and leading forms of finished iron and steel and non-ferrous metals in the 17 years ended with 1931. The diagrams are based on monthly averages of prices quoted week by week in our market reports from the leading selling centers. In the tables following are the monthly average prices of about 80 products, including those on which the charts are based.

Bessemer Pig Iron at Pittsburgh, Gross Ton (2240 lb.)

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$14.59	$21.58	$35.95	$37.25	$33.60	$40.00	$33.96	$21.56	$29.27	$24.76	$24.64	$22.76	$21.26	$19.26	$20.01	$20.76	$19.26
Feb.	14.55	21.51	35.95	37.25	33.60	42.90	31.46	21.46	29.83	25.26	24.51	22.76	20.76	19.26	20.01	20.76	19.01
March	14.55	21.75	37.70	37.25	32.54	43.40	28.16	21.46	32.02	25.14	24.06	22.76	21.16	19.26	20.14	20.76	18.76
April	14.55	21.95	42.20	36.15	29.35	43.60	26.96	22.59	32.77	24.56	22.89	21.39	21.26	19.26	20.26	20.76	18.76
May	14.59	21.95	45.15	36.15	29.35	44.03	26.16	26.36	31.87	23.89	21.76	21.14	20.96	19.06	20.76	20.76	18.76
June	14.70	21.95	54.70	36.38	29.35	44.80	24.71	26.96	30.27	22.89	20.76	20.76	20.64	18.76	20.76	20.76	18.76
July	14.95	21.95	57.45	36.60	29.35	47.15	22.84	26.77	28.46	21.96	20.76	20.39	20.26	18.76	20.76	20.36	18.76
Aug.	15.95	21.95	54.75	36.60	29.35	49.11	21.96	29.96	28.26	21.76	20.76	19.76	20.16	18.76	20.76	20.26	18.76
Sept.	16.85	22.26	48.03	36.60	29.35	50.46	21.96	35.27	28.26	21.76	21.06	20.01	19.76	18.95	20.76	20.06	18.76
Oct.	16.95	24.08	37.25	36.60	29.35	49.16	21.96	35.17	26.96	21.76	21.39	20.89	19.76	19.31	20.76	19.51	18.64
Nov.	17.51	30.15	37.25	36.60	31.26	41.10	21.96	33.52	25.26	22.13	22.64	21.66	19.76	19.95	20.76	19.26	18.26
Dec.	19.65	35.68	37.25	36.60	36.65	36.96	21.96	29.90	24.64	23.66	22.76	21.64	19.39	20.01	20.76	19.26	17.96
Aver.	*15.78*	*23.90*	*43.64*	*36.67*	*31.09*	*44.39*	*25.34*	*27.58*	*28.68*	*23.29*	*22.33*	*21.33*	*20.46*	*19.22*	*20.54*	*19.79*	*18.70*

Basic Pig Iron, f.o.b. Mahoning or Shenango Valley Furnace, Gross Ton

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$12.50	$17.81	$30.00	$33.00	$30.00	$37.40	$30.00	$18.15	$25.80	$21.25	$22.00	$20.00	$18.00	$17.00	$17.50	$18.50	$17.00
Feb.	12.50	17.69	30.00	33.00	30.00	42.25	27.50	17.75	26.25	22.00	22.00	20.00	18.00	17.00	17.50	18.50	16.75
March	12.50	18.20	32.25	33.00	28.94	41.50	24.20	17.94	30.13	21.94	21.30	20.00	18.40	17.00	17.50	18.50	16.50
April	12.50	18.13	38.75	32.00	25.75	42.40	22.88	20.00	31.05	21.55	20.13	18.63	19.00	16.88	17.90	18.50	16.50
May	12.50	18.00	41.60	32.00	25.75	43.25	22.00	24.60	29.00	20.50	18.81	18.38	18.20	16.30	18.38	18.50	16.25
June	12.59	18.00	48.75	32.00	25.75	44.00	20.75	25.00	27.38	19.63	18.05	18.00	17.88	15.45	18.50	18.50	15.50
July	12.74	18.00	52.50	32.00	25.75	45.85	19.38	24.25	25.10	19.00	18.00	17.63	17.50	16.00	18.50	18.10	15.50
Aug.	14.06	18.00	51.20	32.00	25.75	48.10	18.20	26.60	24.75	19.00	18.00	17.50	17.30	16.00	18.50	18.00	15.50
Sept.	14.75	18.31	42.75	32.00	25.75	48.50	19.13	32.63	24.88	19.00	18.30	17.50	17.06	16.19	18.50	17.60	15.50
Oct.	15.00	19.88	33.00	33.00	25.75	43.75	19.19	30.90	23.50	19.00	18.63	18.00	17.00	17.10	18.50	17.00	15.25
Nov.	15.75	25.10	33.00	33.00	28.31	36.50	19.00	27.75	20.88	19.13	19.38	18.50	17.00	17.50	18.50	17.00	15.00
Dec.	17.50	30.00	33.00	33.00	34.25	33.00	18.63	24.81	21.00	20.90	20.00	18.50	17.00	17.50	18.50	17.00	15.00
Aver.	*13.74*	*19.76*	*38.90*	*32.50*	*27.65*	*42.21*	*21.74*	*24.20*	*25.81*	*20.24*	*19.59*	*18.55*	*17.70*	*16.66*	*18.19*	*17.98*	*15.85*

Local No. 2 Foundry Pig Iron at Chicago (at Furnace), Gross Ton

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$13.00	$18.50	$30.00	$33.00	$31.00	$40.00	$31.50	$18.90	$28.90	$23.70	$24.00	$23.00	$20.88	$18.50	$20.00	$20.00	$17.50
Feb.	13.00	18.50	32.00	33.00	31.00	42.25	29.00	19.00	29.75	24.50	24.00	23.00	20.25	18.50	20.00	20.00	17.50
March	12.95	18.70	36.00	33.00	29.94	43.00	25.60	20.00	31.25	24.38	23.80	23.00	20.00	18.50	20.00	19.50	17.50
April	13.00	19.00	39.25	33.00	26.75	43.00	24.00	20.50	32.00	24.10	22.50	22.00	20.00	18.50	20.00	19.40	17.50
May	13.00	19.00	43.80	33.00	26.75	43.00	22.80	22.60	32.00	22.75	21.13	21.63	20.00	18.20	20.00	19.00	17.50
June	13.00	19.00	51.00	33.00	26.75	43.40	20.75	23.25	31.25	21.25	20.30	21.10	20.00	18.00	20.00	18.39	17.50
July	13.00	19.00	55.00	33.00	26.75	45.25	19.00	24.25	27.90	19.60	20.50	21.00	20.00	17.60	20.00	17.90	17.50
Aug.	13.44	18.40	55.00	33.00	26.75	46.00	19.55	28.60	27.00	20.38	20.50	21.00	19.50	17.63	20.00	17.50	17.50
Sept.	13.90	18.13	54.67	33.00	26.75	46.00	21.75	32.00	26.75	20.50	21.00	21.00	19.50	18.25	20.00	17.50	17.50
Oct.	14.63	19.63	33.00	34.00	27.75	44.50	21.00	31.40	25.00	20.50	21.63	21.00	19.00	18.80	20.00	17.50	17.00
Nov.	17.13	25.80	33.00	34.00	31.00	39.40	20.60	29.75	23.13	21.00	22.75	21.00	18.50	20.00	20.00	17.50	17.00
Dec.	18.10	29.50	33.00	34.00	38.75	34.50	19.63	28.00	23.00	22.50	23.00	21.00	18.50	20.00	20.00	17.50	16.70
Aver.	*14.01*	*20.26*	*41.31*	*33.25*	*29.16*	*42.53*	*22.93*	*24.85*	*28.16*	*22.10*	*22.09*	*21.64*	*19.68*	*18.54*	*20.00*	*18.47*	*17.35*

Standard Brands Eastern Pennsylvania No. 2X Foundry Pig Iron at Philadelphia, Gross Ton

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$14.25	$19.94	$30.10	$34.25	$36.15	$44.10	$33.34	$21.34	$29.76	$24.11	$25.01	$24.26	$22.76	$20.56	$21.76	$21.26	$18.26
Feb.	14.25	20.00	31.88	34.25	36.15	45.10	31.09	21.09	30.01	24.04	25.01	24.14	22.26	21.14	21.76	21.26	18.26
March	14.25	20.05	37.31	34.25	34.39	45.53	27.59	21.26	32.30	24.16	24.21	23.36	22.26	21.26	21.89	20.76	18.26
April	14.25	20.50	41.38	34.25	31.90	46.85	26.26	23.62	32.95	23.06	22.82	23.26	22.26	21.26	22.26	20.76	18.26
May	14.25	20.50	43.60	34.25	30.70	47.10	25.71	26.09	32.76	22.67	21.51	22.89	22.26	21.26	22.26	20.39	17.76
June	14.25	19.94	48.19	34.29	29.50	47.15	25.50	27.06	30.76	21.85	21.26	22.66	22.14	21.26	22.26	20.26	17.71
July	14.31	19.75	53.13	34.40	29.08	48.15	23.55	27.92	27.68	21.26	21.26	22.26	21.51	20.86	22.16	19.96	17.51
Aug.	14.94	19.55	53.00	34.40	29.60	51.96	20.64	32.26	25.89	21.51	21.57	22.26	21.26	20.76	21.76	19.76	17.32
Sept.	16.00	19.50	51.67	34.40	30.70	53.51	21.22	34.83	26.26	21.76	21.96	22.26	20.76	21.01	21.76	19.56	16.86
Oct.	16.25	20.31	34.25	38.85	32.10	52.53	22.23	32.54	24.04	21.76	22.64	22.26	20.51	21.26	21.76	19.26	16.64
Nov.	17.12	24.90	34.25	39.15	35.35	44.99	22.74	30.39	23.01	22.64	23.64	23.56	20.26	21.64	21.76	19.01	16.07
Dec.	19.05	29.25	34.25	39.15	40.10	35.54	21.82	28.86	24.26	24.56	24.26	23.39	20.26	21.76	21.46	18.26	16.01
Aver.	*15.26*	*21.18*	*41.08*	*35.49*	*32.98*	*46.88*	*25.14*	*27.27*	*28.31*	*22.78*	*22.93*	*23.05*	*21.55*	*21.17*	*21.90*	*20.04*	*17.41*

Southern No. 2 Foundry Pig Iron at Cincinnati, Gross Ton

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$12.40	$17.90	$26.10	$35.90	$34.60	$41.80	$36.75	$20.70	$27.45	$25.55	$24.05	$25.69	$22.19	$19.69	$20.19	$17.69	$14.19
Feb.	12.40	17.90	27.53	35.90	34.60	43.60	32.63	20.00	28.68	26.55	24.05	25.69	21.69	19.69	20.19	17.19	14 19
March	12.27	17.90	31.90	35.90	33.54	43.60	29.80	19.50	30.80	26.55	24.05	25.69	21.69	19.69	19.69	16.69	14.19
April	12.34	17.90	37.40	35.90	30.65	44.00	28.00	20.38	31.05	26.35	24.05	25.69	21.69	19.69	19.09	16.69	14.19
May	12.40	17.90	41.90	35.90	29.85	45.60	26.70	22.10	30.75	25.55	24.05	25.69	21.69	19.39	18.69	16.69	14.69
June	12.50	17.34	45.15	36.08	28.39	45.60	26.38	23.00	29.30	24.05	23.25	24.59	21.69	19.56	18.69	16.69	14.69
July	12.71	16.90	49.90	36.60	28.35	45.60	24.75	22.30	28.85	22.05	22.18	24.19	21.13	19.19	17.99	16.39	14.69
Aug.	13.71	16.70	49.90	36.60	30.40	45.78	23.50	24.35	27.68	21.55	22.55	24.19	20.94	19.39	17.57	15.82	14.69
Sept.	14.15	17.28	49.90	36.60	31.25	46.50	23.50	29.55	26.55	21.55	22.85	24.07	20.94	19.94	17.19	15.49	14.69
Oct.	14.78	18.03	49.38	37.60	31.60	46.50	23.50	30.85	24.68	21.55	23.43	23.69	20.94	19.94	17.30	15.19	14.69
Nov.	16.15	22.40	35.90	37.60	34.35	42.50	22.90	27.55	23.65	21.80	24 87	23.69	19.69	20.07	17.69	14.94	14.69
Dec.	17.10	25.90	35.90	37.60	38.60	42.50	21.75	26.93	25.05	23.85	25.49	23.69	19.69	20.19	17.69	14.39	14.69
Aver.	*13.58*	*18.67*	*40.07*	*36.52*	*32.16*	*44.47*	*26.68*	*23.93*	*27.87*	*23.91*	*23.74*	*24.71*	*21.16*	*19.70*	*18.51*	*16.16*	*14.52*

Mahoning and Shenango Valley, No. 2 Foundry Iron, at Furnace, Gross Ton

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$13.00	$18.50	$31.00	$33.00	$31.00	$39.40	$31.88	$19.30	$27.00	$22.50	$22.38	$20.50	$18.50	$17.25	$17.50	$18.50	$17.00
Feb.	13.00	18.31	32.00	33.00	31.00	41.50	28.00	18.88	27.50	23.00	22.00	20.50	18.50	17.25	17.50	18.50	16.75
March	12.00	18.50	34.75	33.00	29.94	41.25	25.90	19.00	30.50	23.00	21.10	20.50	18.50	17.25	17.75	18.50	16.50
April	12.75	18.50	39.75	33.00	26.75	42.80	24.75	20.75	31.00	21.80	20.13	19.00	18.50	17.25	18.00	18.50	17.00
May	12.94	18.20	42.40	33.00	26.75	44.25	23.50	23.80	30.20	20.75	19.13	18.88	18.50	17.20	18.50	18.50	17.00
June	12.69	18.13	50.25	33.00	26.75	45.00	22.10	24.00	27.63	19.63	18.30	17.96	18.13	16.75	18.50	18.50	17.00
July	12.70	18.25	54.50	33.00	26.75	45.00	20.13	24.25	25.50	19.00	18.50	17.69	18.00	16.65	18.50	18.10	17.00
Aug.	13.62	18.25	53.20	33.00	26.75	47.00	19.63	32.60	24.88	19.13	18.50	17.50	17.60	16.50	18.50	18.00	17.00
Sept.	14.70	18.39	47.00	33.00	26.75	49.40	21.00	34.88	24.75	19.80	18.80	17.63	17.50	16.88	18.50	17.80	17.00
Oct.	14.87	20.00	33.00	34.00	26.75	46.50	21.00	31.80	23.60	19.50	19.13	18.50	17.50	17.10	18.50	17.13	16.63
Nov.	15.50	25.00	33.00	34.00	31.50	40.25	20.75	27.88	21.88	19.50	20.39	19.00	17.45	17.63	18.50	17.00	16.00
Dec.	18.30	30.75	33.00	34.00	36.75	36.20	20.00	25.63	22.00	21.20	20.50	18.80	17.25	17.70	18.50	17.00	15.70
Aver.	*13.92*	*20.07*	*40.32*	*33.25*	*28.95*	*43.21*	*23.22*	*25.23*	*26.37*	*20.73*	*19.90*	*18.87*	*18.00*	*17.12*	*18.23*	*18.00*	*16.72*

No. 2 Foundry Pig Iron at Buffalo Furnace, Gross Ton

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$12.89	$18.75	$34.94	$33.00	$31.00	$40.90	$32.38	$19.44	$26.94	$22.25	$23.00	$21.00	$18.50	$17.00	$18.00	$18.75	$17.50
Feb.	13.00	18.53	35.25	33.00	31.00	42.00	30.50	18.87	27.56	22.25	22.75	21.00	17.39	17.00	18.39	18.50	17.50
March	12.41	18.72	38.45	33.00	29.94	44.75	29.00	18.30	29.05	21.81	22.12	21.00	17.05	17.00	18.50	18.50	17.50
April	12.80	18.88	42.62	33.00	26.75	45.00	26.15	20.81	29.56	21.37	20.65	21.00	17.50	17.00	18.50	18.50	17.50
May	12.88	18.78	44.95	33.00	26.75	45.00	25.62	22.62	29.40	20.25	19.00	20.75	17.50	17.00	18.50	18.50	17.13
June	12.87	18.65	48.31	33.00	26.75	44.75	23.42	23.05	29.06	19.37	19.00	19.60	17.39	17.00	18.75	18.50	17.00
July	12.70	18.70	52.25	33.00	26.63	45.00	20.87	24.50	26.00	19.00	18.85	19.00	16.94	17.00	19.50	18.50	17.00
Aug.	13.85	18.63	53.00	33.00	27.77	47.75	19.50	30.70	24.95	19.19	18.72	19.00	16.20	17.00	19.50	18.50	17.00
Sept.	14.90	19.00	53.00	33.00	28.25	50.10	20.00	33.94	24.87	19.37	18.75	19.00	16.25	17.00	19.50	18.50	17.00
Oct.	15.63	20.37	33.00	34.00	28.70	47.44	20.37	31.12	23.06	19.05	19.40	19.00	16.88	17.10	19.50	17.75	17.00
Nov.	16.28	27.25	33.00	34.00	34.30	42.56	19.12	27.80	20.87	20.50	21.19	19.00	17.00	17.88	19.50	17.50	17.00
Dec.	18.13	32.75	33.00	34.00	38.25	36.60	19.30	25.50	21.56	22.62	21.50	19.00	17.00	18.00	19.50	17.50	16.80
Aver.	*14.03*	*20.75*	*41.81*	*33.25*	*29.67*	*44.32*	*23.85*	*24.72*	*26.07*	*20.59*	*20.41*	*19.86*	*17.13*	*17.17*	*18.97*	*18.29*	*17.16*

Malleable Pig Iron at Chicago, Gross Ton

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$13.00	$19.00	$30.94	$33.50	$31.50	$40.50	$32.00	$18.90	$28.90	$23.88	$24.00	$23.00	$20.88	$18.50	$20.00	$20.00	$17.50
Feb.	13.00	19.00	31.75	33.50	31.50	42.75	29.38	19.13	29.75	24.50	24.00	23.00	20.25	18.50	20.00	20.00	17.50
March	13.00	19.40	35.40	33.50	30.44	43.50	25.80	20.00	31.25	24.38	24.00	23.00	20.00	18.50	20.00	19.50	17.50
April	13.00	19.50	39.00	33.50	27.25	43.50	24.00	20.50	32.00	24.10	22.63	22.00	20.00	18.50	20.00	19.40	17.50
May	13.00	19.50	43.60	33.50	27.25	43.50	23.00	22.60	32.00	22.75	21.25	21.42	20.00	18.22	20.00	19.00	17.50
June	13.00	19.50	50.25	33.50	27.25	43.50	21.50	23.25	31.25	21.25	20.60	21.10	20.00	18.00	20.00	18.50	17.50
July	13.00	19.50	55.00	33.50	27.25	45.25	19.00	24.25	27.90	19.60	20.50	21.00	20.00	17.60	20.00	17.90	17.50
Aug.	13.44	19.00	55.00	33.50	27.25	46.50	19.60	28.60	27.00	20.38	20.50	21.00	19.50	17.63	20.00	17.50	17.50
Sept.	14.30	19.00	54.75	33.50	27.25	46.50	21.75	32.00	26.75	20.50	21.00	21.00	19.50	18.25	20.00	17.50	17.50
Oct.	15.25	19.88	33.50	34.50	28.25	45.75	21.00	31.40	25.00	20.50	21.63	21.00	19.00	18.80	20.00	17.50	17.10
Nov.	17.13	25.80	33.50	34.50	31.50	39.90	20.60	29.75	23.13	20.88	22.75	21.00	18.50	20.00	20.00	17.50	17.00
Dec.	18.20	29.50	33.50	34.50	39.50	35.00	19.63	28.00	23.00	22.62	23.00	21.00	18.50	20.00	20.00	17.50	16.70
Aver.	*14.11*	*20.72*	*41.35*	*33.75*	*29.68*	*43.01*	*23.11*	*24.87*	*28.16*	*22.11*	*22.15*	*21.63*	*19.68*	*18.54*	*20.00*	*18.48*	*17.36*

Lake Superior Charcoal Pig Iron at Chicago, Gross Ton

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$15.75	$19.50	$31.75	$37.50	$38.85	$48.75	$42.50	$31.10	$33.15	$29.15	$29.04	$29.04	$27.04	$27.04	$27.04	$27.04	$27.04
Feb.	15.75	19.75	33.75	37.50	38.85	58.38	39.50	29.38	33.90	29.15	29.04	29.04	27.04	27.04	27.04	27.04	27.04
March	15.75	19.75	36.75	37.50	38.85	58.20	38.50	26.00	35.40	29.15	29.04	29.04	27.04	27.04	27.04	25.04	26.24
April	15.75	19.75	40.25	37.50	31.75	57.25	38.50	26.50	36.53	29.15	29.04	29.04	27.04	27.04	27.04	27.04	25.04
May	15.75	19.75	48.15	37.50	31.75	57.50	37.50	28.40	36.65	29.15	29.04	29.04	27.04	27.04	27.04	27.04	25.04
June	15.75	19.75	52.88	37.62	31.75	57.50	37.50	29.75	36.65	29.12	29.04	29.04	27.04	27.04	27.04	27.04	25.04
July	15.75	19.75	57.75	38.00	31.75	57.50	36.37	31.65	34.81	29.04	29.04	29.04	27.04	27.04	27.04	27.04	25.04
Aug.	16.00	19.75	58.00	38.00	32.25	57.70	33.60	34.05	32.04	29.04	29.04	29.04	27.04	27.04	27.04	27.04	25.04
Sept.	15.85	19.75	58.00	38.00	32.75	58.50	33.00	36.15	32.04	29.04	29.04	29.04	27.04	27.04	27.04	27.04	25.04
Oct.	15.75	20.25	37.50	38.00	33.44	58.50	31.50	36.15	29.86	29.04	29.04	27.54	27.04	27.04	27.04	27.04	25.04
Nov.	17.00	26.46	37.50	38.70	38.50	55.75	31.50	36.15	28.40	29.04	29.04	27.54	27.04	27.04	27.04	27.04	25.04
Dec.	18.65	31.75	37.50	38.70	43.00	49.13	31.50	34.65	29.15	29.04	29.04	27.04	27.04	27.04	27.04	27.04	23.04
Aver.	*16.13*	*21.33*	*44.15*	*37.88*	*35.29*	*56.22*	*35.96*	*31.66*	*33.22*	*29.09*	*29.04*	*28.58*	*27.04*	*27.04*	*27.04*	*26.87*	*25.31*

No. 2 Foundry Pig Iron at Cleveland, f.o.b. Furnace, Gross Ton

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$13.44	$19.30	$31.10	$33.30	$31.40	$40.00	$33.40	$20.06	$27.37	$23.20	$23.37	$21.82	$19.00	$18.00	$19.00	$19.00	$17.50
Feb.	13.50	19.23	32.93	33.30	31.40	41.90	30.22	20.06	28.50	24.00	23.49	21.88	18.63	18.00	19.00	19.00	17.50
March	13.47	19.05	37.06	33.30	30.58	43.15	27.80	21.55	31.65	24.00	23.97	21.31	19.40	18.00	19.00	19.00	17.20
April	13.38	19.36	40.27	33.30	27.15	43.40	26.62	20.81	32.02	23.75	22.32	20.35	19.37	18.00	19.00	18.88	17.00
May	13.38	19.45	42.90	33.30	27.15	44.53	25.50	23.75	31.71	22.75	20.37	19.50	19.00	18.00	19.00	18.50	17.00
June	13.28	19.07	50.63	33.32	27.15	44.90	24.00	24.06	29.96	21.00	19.62	19.19	18.70	17.88	19.00	18.50	17.00
July	13.20	18.79	55.80	33.40	27.15	45.20	21.31	24.75	26.94	19.75	19.50	19.00	18.50	17.50	19.00	18.00	17.00
Aug.	14.32	18.76	55.17	33.40	27.40	48.06	20.50	31.31	25.90	20.06	19.50	19.00	18.50	17.50	19.00	18.00	17.00
Sept.	15.27	18.92	53.15	33.40	27.65	49.86	20.75	35.94	25.37	20.31	19.50	19.00	18.50	17.88	19.00	17.60	17.00
Oct.	15.43	20.12	33.30	34.40	28.15	47.88	20.75	33.59	24.75	20.50	20.05	19.37	18.38	18.13	19.00	17.50	17.00
Nov.	16.61	26.20	33.30	34.40	31.90	43.46	20.56	29.97	22.85	20.81	21.82	20.10	18.00	19.00	19.00	17.50	17.00
Dec.	18.18	31.13	33.30	34.40	36.90	36.32	19.95	26.75	22.56	21.88	21.76	19.88	18.00	19.00	19.00	17.50	16.60
Aver.	*14.46*	*20.78*	*41.58*	*33.60*	*29.67*	*44.06*	*24.28*	*26.05*	*27.47*	*21.84*	*21.19*	*20.03*	*18.67*	*18.16*	*19.00*	*18.25*	*17.07*

Southern No. 2 Foundry Pig Iron at Birmingham, Gross Ton

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$9.50	$15.00	$23.20	$33.00	$31.00	$38.75	$32.25	$16.20	$23.25	$21.50	$20.00	$22.00	$18.50	$16.00	$16.50	$14.50	$13.80
Feb.	9.50	15.00	24.63	33.00	31.00	40.00	28.13	15.00	24.38	22.50	20.00	22.00	18.00	16.00	16.50	14.63	12.88
March	9.35	15.00	29.00	33.00	29.44	40.00	25.30	15.00	26.40	22.50	20.00	22.00	18.00	16.00	16.00	14.50	12.38
April	9.44	15.00	34.50	33.00	26.75	40.50	23.50	15.88	27.00	22.30	20.00	22.00	18.00	16.00	15.40	14.00	12.00
May	9.44	15.00	39.00	33.00	26.75	42.00	22.20	17.60	26.85	21.50	20.00	22.00	18.00	15.70	15.00	14.00	12.00
June	9.65	14.50	42.25	33.00	25.25	42.00	21.88	18.38	25.75	20.00	19.60	21.20	18.00	15.88	15.00	14.00	12.00
July	9.75	14.00	47.00	33.00	25.15	42.00	20.25	18.25	25.00	18.00	18.00	21.00	17.44	15.50	14.63	14.00	12.00
Aug.	10.75	13.80	47.00	33.00	27.38	42.00	19.00	20.10	23.70	17.50	18.00	21.00	17.25	15.69	14.50	14.00	12.00
Sept.	11.50	14.38	47.00	33.00	27.95	42.00	19.00	26.00	22.75	17.50	18.50	20.75	17.25	16.25	14.50	14.00	12.00
Oct.	12.13	15.50	33.00	34.00	28.00	42.00	19.00	26.80	20.63	17.50	19.38	20.00	17.25	16.25	14.50	14.00	12.00
Nov.	13.40	20.13	33.00	34.00	30.75	38.00	18.40	23.50	19.60	17.75	21.00	20.00	16.00	16.39	14.50	14.00	12.00
Dec.	14.38	23.00	33.00	33.40	35.20	38.00	17.33	22.88	21.00	19.80	22.00	20.00	16.00	16.50	14.50	14.00	12.00
Aver.	*10.73*	*15.86*	*36.05*	*33.20*	*28.72*	*40.60*	*22.19*	*19.63*	*23.86*	*19.86*	*19.71*	*21.16*	*17.47*	*16.01*	*15.13*	*14.14*	*12.27*

THE IRON AGE Composite Iron and Steel Prices

Composite Pig Iron Price

Average of THE IRON AGE quotations on basic pig iron at Valley furnace and foundry iron at Chicago, Birmingham, Buffalo, Valley and Philadelphia. Quoted on gross ton

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$12.38	$17.81	$28.88	$33.21	$31.36	$39.08	$31.18	$18.48	$26.78	$22.15	$22.44	$21.79	$19.44	$17.63	$18.43	$18.19	$15.90
Feb.	12.38	17.76	29.75	33.21	31.36	42.35	28.45	18.14	27.20	22.84	22.50	21.77	19.07	17.73	18.38	18.02	15.80
March	12.34	18.06	32.18	33.21	30.10	42.17	25.18	18.35	30.11	22.81	21.99	21.65	19.03	17.73	18.36	17.75	15.71
April	12.37	18.15	38.56	32.71	27.11	42.93	23.73	20.00	30.83	22.31	20.95	20.96	19.21	17.67	18.52	17.73	15.79
May	12.37	18.08	41.87	32.71	26.91	43.64	22.78	23.35	29.74	21.40	19.85	20.69	19.09	17.45	18.70	17.60	15.76
June	12.45	17.91	47.95	32.71	26.46	44.09	21.73	23.95	28.23	20.27	19.22	20.00	18.92	17.23	18.65	17.48	15.62
July	12.55	17.79	52.11	32.73	26.37	45.44	20.22	23.86	25.96	19.31	18.96	19.51	18.56	17.10	18.48	17.16	15.56
Aug.	13.55	17.63	51.43	32.73	26.83	47.38	18.97	26.69	25.19	19.40	19.01	19.46	18.17	17.11	18.39	16.90	15.51
Sept.	14.28	17.82	46.93	32.73	27.11	47.83	19.89	31.78	25.02	19.46	19.39	19.46	18.03	17.54	18.27	16.70	15.44
Oct.	14.67	19.18	33.21	34.31	27.52	45.05	19.97	30.57	23.30	19.46	19.92	19.69	17.96	17.94	18.33	16.31	15.21
Nov.	15.82	24.36	33.21	34.36	30.34	38.65	19.79	27.82	21.40	19.79	21.16	20.13	17.59	18.46	18.36	16.21	14.97
Dec.	17.34	28.63	33.21	34.26	36.13	34.51	19.11	25.70	21.88	21.60	21.54	19.94	17.55	18.51	18.24	15.95	14.86
Aver.	*13.54*	*19.43*	*36.11*	*33.24*	*28.97*	*42.76*	*22.58*	*24.06*	*26.30*	*20.90*	*20.58*	*20.42*	*18.55*	*17.68*	*18.43*	*17.17*	*15.51*

Composite Price of Finished Steel

Average of THE IRON AGE quotations on steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets. Quoted in cents a pound

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	1.383	2.06	3.384	3.549	3.371	3.158	3.057	2.059	2.469	2.783	2.560	2.447	2.432	2.318	2.391	2.325	2.137
Feb.	1.395	2.203	3.501	3.549	3.371	3.486	2.918	2.007	2.605	2.782	2.546	2.428	2.378	2.361	2.391	2.307	2.142
March	1.413	2.447	3.739	3.549	3.282	3.743	2.764	2.014	2.721	2.746	2.537	2.433	2.367	2.362	2.391	2.312	2.134
April	1.437	2.611	4.110	3.549	3.031	3.842	2.737	2.075	2.814	2.692	2.503	2.439	2.360	2.359	2.412	2.259	2.128
May	1.433	2.75	4.562	3.549	3.021	3.804	2.764	2.113	2.793	2.639	2.460	2.416	2.360	2.350	2.412	2.221	2.114
June	1.444	2.689	5.004	3.549	3.021	3.756	2.643	2.148	2.789	2.610	2.440	2.420	2.369	2.341	2.412	2.207	2.109
July	1.471	2.64	5.334	3.549	3.021	3.885	2.455	2.169	2.783	2.563	2.435	2.431	2.367	2.325	2.412	2.177	2.127
Aug.	1.511	2.682	5.249	3.549	3.021	3.967	2.341	2.292	2.775	2.515	2.413	2.431	2.367	2.348	2.402	2.156	2.116
Sept.	1.559	2.765	5.049	3.549	3.004	3.956	2.248	2.419	2.775	2.487	2.397	2.439	2.356	2.348	2.394	2.146	2.116
Oct.	1.634	2.856	3.470	3.55	3.052	3.81	2.218	2.461	2.775	2.464	2.405	2.449	2.319	2.363	2.371	2.137	2.116
Nov.	1.769	3.021	3.444	3.549	3.084	3.566	2.129	2.445	2.775	2.481	2.433	2.453	2.299	2.367	2.362	2.135	2.116
Dec.	1.941	3.278	3.441	3.461	3.11	3.114	2.107	2.439	2.775	2.540	2.450	2.453	2.310	2.385	2.362	2.124	2.084
Aver.	*1.534*	*2.671*	*4.188*	*3.542*	*3.115*	*3.675*	*2.532*	*2.220*	*2.738*	*2.609*	*2.465*	*2.439*	*2.357*	*2.352*	*2.393*	*2.209*	*2.120*

Bessemer Pig Iron, Gross Ton, at Valley Furnace

	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$38.60	$32.00	$19.60	$27.50	$23.00	$22.88	$21.00	$19.50	$17.50	$18.25	$19.00	$17.50
Feb.	41.50	29.00	19.50	28.06	23.50	22.75	21.00	19.00	17.50	18.25	19.00	17.25
March	42.00	26.20	19.50	30.25	23.38	22.30	21.00	19.40	17.50	18.38	19.00	17.00
April	42.20	25.00	20.63	31.00	22.80	21.13	19.63	19.50	17.50	18.50	19.00	17.00
May	42.63	24.20	24.40	30.10	22.13	20.00	19.38	19.20	17.30	19.00	19.00	17.00
June	43.00	22.75	25.00	28.50	21.13	19.00	19.00	18.88	17.00	19.00	19.00	17.00
July	45.60	20.88	25.00	26.70	20.20	19.00	18.63	18.50	17.00	19.00	18.60	17.00
Aug.	47.39	20.00	28.20	26.50	20.00	19.00	18.00	18.40	17.00	19.00	18.50	17.00
Sept.	48.50	20.00	33.50	26.50	20.00	19.30	18.25	18.00	17.19	19.00	18.30	17.00
Oct.	47.25	20.00	33.40	25.20	20.00	19.63	19.13	18.00	17.55	19.00	17.75	16.88
Nov.	40.25	20.00	31.75	23.25	20.38	20.88	19.90	18.00	18.19	19.00	17.50	16.50
Dec.	35.00	20.00	28.13	22.88	21.90	21.00	19.88	17.56	18.25	19.00	17.50	16.20
Aver.	*42.82*	*23.34*	*25.63*	*27.20*	*21.53*	*20.57*	*19.57*	*18.66*	*17.46*	*18.78*	*18.51*	*16.94*

Malleable Pig Iron, Gross Ton, f.o.b. Valley Furnace

	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$39.25	$32.00	$19.50	$27.00	$22.39	$22.39	$20.50	$18.50	$17.30	$18.00	$19.00	$17.50
Feb.	42.75	28.75	19.00	27.63	23.00	22.00	20.50	18.50	17.25	18.00	19.00	17.25
March	42.40	25.80	19.00	30.50	22.50	21.50	20.50	18.50	17.25	18.25	19.00	17.00
April	43.25	25.00	19.50	31.00	22.10	20.63	19.00	18.50	17.25	18.50	19.00	17.00
May	43.88	24.10	24.20	30.20	21.00	19.25	18.88	18.50	17.25	19.00	19.00	17.00
June	44.20	22.75	24.50	28.13	19.88	18.50	18.05	18.13	17.00	19.00	19.00	17.00
July	45.00	20.88	25.13	25.40	19.00	18.50	17.75	18.00	17.00	19.00	18.60	17.00
Aug.	48.40	20.00	29.50	24.50	19.13	18.50	17.50	17.60	17.00	19.00	18.50	17.00
Sept.	50.00	20.13	33.50	24.50	19.80	18.80	17.63	17.50	17.19	19.00	18.30	17.00
Oct.	49.00	20.50	32.70	23.30	19.50	19.13	18.50	17.50	17.55	19.00	17.75	16.88
Nov.	39.30	20.20	29.00	20.88	19.75	20.38	19.00	17.50	18.19	19.00	17.50	16.50
Dec.	35.00	20.00	26.25	20.00	21.20	20.50	18.75	17.50	18.15	19.00	17.50	16.20
Aver.	*43.53*	*23.34*	*25.15*	*26.09*	*20.77*	*20.01*	*18.88*	*18.02*	*17.37*	*18.73*	*18.51*	*16.94*

Basic Pig Iron, Delivered Eastern Pennsylvania

	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$23.00	$24.25	$23.00	$21.50	$19.50	$19.75	$19.50	$17.25
Feb.	22.69	23.88	23.00	21.19	19.50	19.88	19.44	17.25
March	21.81	23.55	22.10	20.85	19.50	20.25	19.06	17.25
April	21.50	22.31	21.75	20.75	19.50	20.25	18.90	17.13
May	21.00	21.13	21.75	20.75	19.10	20.25	18.75	17.00
June	21.00	21.50	21.45	20.75	19.00	20.25	18.75	17.00
July	20.20	21.50	21.00	20.75	18.95	20.20	18.45	16.75
Aug.	20.00	20.50	20.95	20.15	18.75	19.75	18.25	16.75
Sept.	20.00	20.70	20.75	20.00	18.88	19.75	18.15	16.75
Oct.	20.00	21.25	20.69	20.00	19.45	19.75	17.75	16.75
Nov.	21.13	22.39	22.60	19.60	19.75	19.75	17.75	16.39
Dec.	23.41	23.00	22.00	19.25	20.05	19.55	17.75	16.25
Aver.	*21.31*	*22.16*	*21.75*	*20.46*	*19.33*	*19.95*	*18.54*	*16.87*

Virginia No. 2X Foundry Pig Iron, Delivered Eastern Pennsylvania (Gross Ton)

	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$30.17	$29.67	$28.17	$27.67	$24.54	$25.79	$22.79	$22.79
Feb.	30.52	29.67	28.17	26.67	24.54	25.79	22.79	22.79
March	30.67	29.67	28.17	26.67	24.54	25.67	22.79	22.79
April	30.67	29.67	28.17	27.17	24.54	25.29	22.79	22.79
May	30.67	29.17	28.17	27.17	24.54	25.29	22.79	22.79
June	30.67	29.17	28.17	27.17	24.54	24.54	22.79	22.79
July	29.87	29.17	28.17	27.17	24.54	24.54	22.79	22.66
Aug.	28.67	29.17	28.17	26.67	24.41	24.54	22.79	22.54
Sept.	28.67	28.77	28.17	25.98	24.54	24.54	22.79	22.54
Oct.	28.67	28.17	28.17	25.79	24.54	24.54	22.79	22.54
Nov.	28.67	28.17	28.17	25.79	24.60	22.79	22.79	22.54
Dec.	29.27	28.17	28.17	25.79	25.29	22.79	22.79	22.54
Aver.	*29.77*	*29.05*	*28.17*	*26.64*	*24.60*	*24.68*	*22.79*	*22.68*

Billets and Finished Steel

Bessemer Steel Billets at Pittsburgh, Gross Ton

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$19.25	$32.00	$63.00	$47.50	$43.50	$48.00	$43.50	$28.00	$37.30	$40.00	$37.00	$35.00	$35.00	$33.00	$33.00	$34.00	$30.00
Feb.	19.50	33.50	65.00	47.50	43.50	55.25	42.25	28.00	39.63	40.00	37.00	35.00	33.00	33.00	33.25	33.00	30.00
March	19.70	42.40	66.25	47.50	42.25	60.00	38.40	28.00	44.38	40.00	36.70	35.00	34.00	33.00	34.00	33.00	30.00
April	20.00	45.00	73.75	47.50	38.50	60.00	37.50	29.50	45.00	40.00	35.50	35.00	33.25	33.00	34.80	33.00	30.00
May	20.00	45.00	86.00	47.50	38.50	60.00	37.00	34.00	44.60	38.50	35.25	35.00	33.00	33.00	36.00	32.50	29.50
June	20.50	43.50	98.75	47.50	38.50	61.00	37.00	35.00	42.63	38.00	35.00	35.00	33.00	32.25	35.25	31.00	29.00
July	21.38	41.00	100.00	47.50	38.50	62.50	32.25	35.00	42.50	38.00	35.00	35.00	33.00	32.00	35.00	31.00	29.00
Aug.	23.13	44.20	86.00	47.50	38.50	61.00	29.60	36.10	42.50	37.75	35.00	35.00	33.00	32.00	35.00	31.00	29.00
Sept.	24.10	45.00	66.25	47.50	38.50	58.74	29.00	39.50	41.88	36.40	35.00	35.00	33.00	32.00	35.00	31.00	29.00
Oct.	24.63	46.25	49.38	47.50	38.50	55.00	29.00	40.00	40.00	35.75	34.25	35.00	33.00	32.80	35.00	31.00	29.00
Nov.	26.50	52.00	47.50	47.50	41.38	49.70	29.00	37.75	40.00	35.50	34.75	35.00	33.00	33.00	35.00	31.00	29.00
Dec.	30.60	57.50	47.50	45.50	46.00	43.50	29.00	36.50	40.00	36.00	35.00	35.00	33.00	33.00	34.60	30.60	28.80
Aver.	*22.44*	*43.95*	*70.78*	*47.33*	*40.51*	*56.22*	*34.46*	*33.95*	*41.70*	*37.99*	*35.23*	*35.00*	*33.27*	*32.67*	*34.66*	*31.84*	*29.36*

Open-Hearth Steel Billets at Pittsburgh, Gross Ton

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$19.25	$33.00	$63.00	$47.50	$43.50	$48.00	$43.50	$28.00	$37.50	$40.00	$38.00	$35.00	$35.00	$33.00	$33.00	$34.00	$30.00
Feb.	19.50	34.75	65.00	47.50	43.50	55.25	41.00	28.00	39.63	40.00	38.00	35.00	33.00	33.00	33.25	33.00	30.00
March	19.70	42.60	66.25	47.50	42.25	60.00	38.50	28.00	44.39	40.00	36.70	35.00	34.00	33.00	34.00	33.00	30.00
April	20.00	45.00	73.75	47.50	38.50	60.00	37.50	29.50	45.00	40.00	35.50	35.00	33.25	33.00	34.80	33.00	30.00
May	20.00	43.40	86.00	47.50	38.50	60.00	37.00	34.00	45.00	38.50	35.25	35.00	33.00	33.00	36.00	32.50	29.50
June	20.50	41.50	98.75	47.50	38.50	61.00	37.00	35.00	42.63	38.00	35.00	35.00	33.00	32.25	35.25	31.00	29.00
July	21.88	42.75	100.00	47.50	38.50	65.00	32.25	35.00	42.50	38.00	35.00	35.00	33.00	32.00	35.00	31.00	29.00
Aug.	23.50	45.00	82.50	47.50	38.50	61.00	29.60	35.50	42.50	37.75	35 00	35.00	33.00	32.00	35.00	31.00	29.00
Sept.	24.60	45.00	66.25	47.50	38.50	58.75	29.00	39.50	41.88	36.40	35.00	35.00	33.00	32.00	35.00	31.00	29.00
Oct.	25.25	46.25	50.50	47.50	38.50	55.00	29.00	40.00	40.00	35.75	34.25	35.00	33.00	32.80	35.00	31.00	29.00
Nov.	27.25	52.00	47.50	47.50	41.39	49.70	29.00	37.75	40.00	35.50	34.75	35.00	33.00	33.00	35.00	31.00	29.00
Dec.	31.80	57.50	47.50	45.50	46.40	43.50	29.00	36.50	44.00	36.00	35.00	35.00	33.00	33.00	34.60	30.60	28.80
Aver.	*22.77*	*44.06*	*70.58*	*47.33*	*40.54*	*56.43*	*34.36*	*33.90*	*41.75*	*37.99*	*35.62*	*35.00*	*33.27*	*32.67*	*34.66*	*31.84*	*29.36*

Steel Rails at Mill, Open-Hearth, Gross Ton

The extra $2 a gross ton, which was for many years charged for open-hearth rails, was annulled with the rail price announced Oct. 22, 1921

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$30.00	$30.00	$40.00	$57.00	$57.00	$47.00	$47.00	$40.00	$43.00	$43.00	$43.00	$43.00	$43.00	$43.00	$43.00	$43.00	$43.00
Feb.	30.00	30.00	40.00	57.00	57.00	47.00	47.00	40.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00
March	30.00	30.00	40.00	57.00	54.50	49.50	47.00	40.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00
April	30.00	30.00	40.00	57.00	47.00	57.00	47.00	40.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00
May	30.00	35.00	40.00	57.00	47.00	57.00	47.00	40.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00
June	30.00	35.00	40.00	57.00	47.00	57.00	47.00	40.00	43.00	43.00	43 00	43.00	43.00	43.00	43.00	43.00	43.00
July	30.00	35.00	40.00	57.00	47.00	57.00	47.00	40.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00
Aug.	30.00	35.00	40.00	57.00	47.00	57.00	47.00	40.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00
Sept.	30.00	35.00	40.00	57.00	47.00	57.00	47.00	40.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00
Oct.	30.00	35.00	....	57.00	47.00	57.00	45.25	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00
Nov.	30.00	38.00	....	57.00	47.00	57.00	40.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00
Dec.	30.00	40.00	....	57.00	47.00	53.00	40.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00
Aver.	*30.00*	*34.00*	*40.00*	*57.00*	*49.29*	*54.38*	*45.69*	*40.75*	*43.00*	*43.00*	*43.00*	*43.00*	*43.00*	*43.00*	*43.00*	*43.00*	*43.00*

Wire Rods at Pittsburgh

No. 5 Bessemer wire rods, gross ton. Quotations for November and December, 1917, and all of 1918, are Government prices and apply also to open-hearth rods

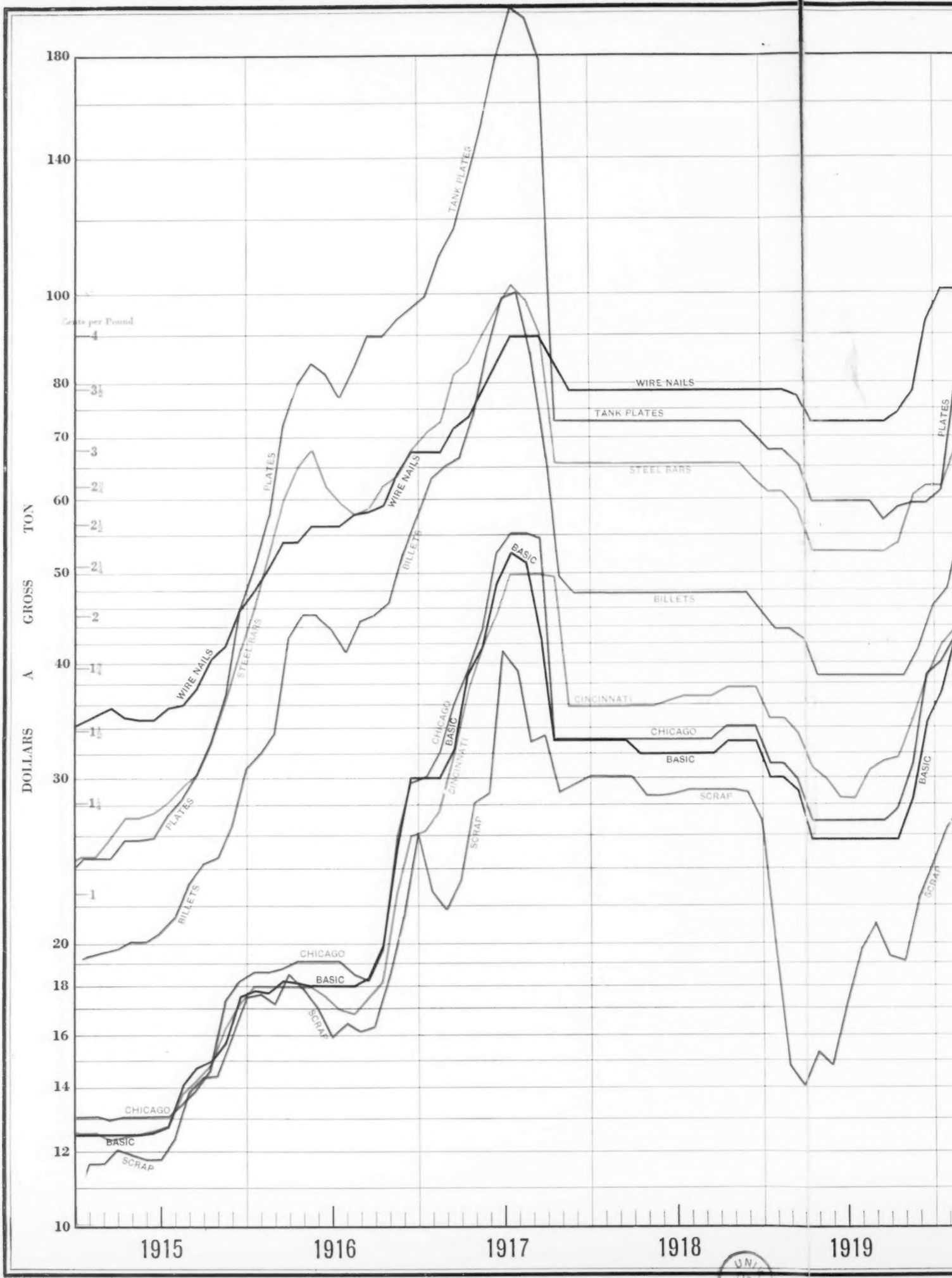
	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$25.00	$43.00	$75.00	$57.00	$57.00	$60.00	$57.00	$36.00	$47.00	$51.00	$48.00	$45.00	$45.00	$41.60	$42.00	$40.00	$35.00
Feb.	25.00	48.00	77.50	57.00	57.00	63.75	54.50	35.75	49.38	51.00	48.00	45.00	43.00	43.00	42.00	39.75	35.00
March	25.00	54.80	81.00	57.00	55.75	70.00	52.00	36.00	50.00	51.00	48.00	45.00	43.00	44.00	42.00	38.00	35.00
April	25.00	60.00	85.00	57.00	52.00	70.00	49.00	38.00	50.25	51.00	47.00	45.00	42.25	44.00	42.00	38.00	35.00
May	25.00	60.00	86.00	57.00	52.00	72.50	48.00	38.00	51.00	48.75	46.00	45.00	42.00	44.00	42.00	36.00	35.00
June	25.00	53.75	92.50	57.00	52.00	75.00	48.00	38.50	51.00	48.00	45.60	45.00	42.00	42.00	42.00	36.00	35.00
July	25.63	53.75	96.25	57.00	52.00	75.00	43.00	40.00	51.00	48.00	45.00	45.00	42.25	42.00	42.00	36.00	35.00
Aug.	27.00	55.00	94.00	57.00	52.00	75.00	41.80	42.40	51.00	46.50	45.00	45.00	43.00	42.00	42.00	36.00	35.00
Sept.	29.40	55.00	88.75	57.00	52.00	75.00	39.50	46.25	51.00	46.00	45.00	45.00	43.00	42.00	42.00	36.00	35.00
Oct.	31.75	55.00	77.25	57.00	52.00	75.00	40.50	45.00	51.00	45.50	45.00	45.00	42.75	42.00	40.00	36.00	35.00
Nov.	36.25	63.00	57.00	57.00	54.50	66.40	40.00	45.00	51.00	45.00	45.00	45.00	41.00	42.00	40.00	36.00	35.00
Dec.	39.50	68.75	57.00	57.00	59.50	57.00	38.00	45.00	51.00	48.00	45.00	45.00	40.00	42.00	40.00	35.20	35.40
Aver.	*28.29*	*55.84*	*79.77*	*57.00*	*53.98*	*69.55*	*45.94*	*40.49*	*50.39*	*48.31*	*46.05*	*45.00*	*42.44*	*42.55*	*41.50*	*36.91*	*35.03*

Plain Wire, Base, at Pittsburgh, Cents a Pound

	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	1.37	1.55	1.35	1.34	1.98	2.95	3.25	3.25	3.25	3.25	2.25	2.45	2.75	2.60	2.50	2.49	2.40	2.50	2.40	2.20
Feb.	1.40	1.55	1.40	1.39	2.10	2.95	3.25	3.25	3.50	3.13	2.20	2.63	2.75	2.60	2.50	2.41	2.48	2.50	2.40	2.20
March	1.40	1.56	1.40	1.40	2.25	3.11	3.25	3.19	3.50	3.00	2.25	2.65	2.75	2.60	2.50	2.40	2.50	2.50	2.40	2.20
April	1.40	1.60	1.40	1.37	2.25	3.23	3.25	3.00	3.50	3.00	2.25	2.68	2.75	2.50	2.50	2.40	2.50	2.50	2.38	2.20
May	1.40	1.60	1.36	1.35	2.45	3.45	3.25	3.00	3.50	3.00	2.25	2.75	2.68	2.50	2.50	2.40	2.50	2.50	2.30	2.20
June	1.40	1.60	1.30	1.35	2.45	3.70	3.25	3.00	3.50	2.75	2.25	2.75	2.65	2.49	2.50	2.40	2.50	2.50	2.30	2.20
July	1.42	1.58	1.32	1.39	2.45	3.95	3.25	3.00	3.50	2.56	2.25	2.75	2.63	2.50	2.50	2.40	2.42	2.50	2.30	2.20
Aug.	1.46	1.48	1.36	1.43	2.53	3.95	3.25	3.00	3.69	2.50	2.29	2.75	2.56	2.50	2.50	2.40	2.40	2.43	2.30	2.20
Sept.	1.50	1.47	1.40	1.54	2.55	3.95	3.25	3.00	3.75	2.58	2.39	2.75	2.53	2.50	2.50	2.40	2.40	2.40	2.30	2.20
Oct.	1.50	1.41	1.40	1.65	2.60	3.25	3.25	3.17	3.75	2.60	2.45	2.75	2.50	2.50	2.50	2.40	2.40	2.40	2.30	2.20
Nov.	1.50	1.39	1.39	1.72	2.80	3.25	3.25	3.29	3.65	2.56	2.45	2.75	2.50	2.50	2.50	2.40	2.40	2.40	2.30	2.20
Dec	1.53	1.35	1.31	1.89	2.95	3.25	3.25	3.21	3.25	2.44	2.45	2.75	2.60	2.50	2.50	2.40	2.48	2.40	2.22	2.20
Aver.	*1.44*	*1.51*	*1.37*	*1.48*	*2.47*	*3.43*	*3.25*	*3.11*	*3.53*	*2.78*	*2.31*	*2.70*	*2.64*	*2.52*	*2.50*	*2.41*	*2.45*	*2.46*	*2.33*	*2.20*

Wire Nails at Pittsburgh, Keg of 100 Lb.

	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$1.57	$1.75	$1.54	$1.54	$2.13	$3.00	$3.50	$3.50	$4.50	$3.25	$2.50	$2.70	$3.00	$2.85	$2.65	$2.64	$2.54	$2.65	$2.33	$1.90
Feb.	1.60	1.75	1.60	1.57	2.25	3.00	3.50	3.50	4.50	3.21	2.40	2.78	3.00	2.85	2.65	2.56	2.63	2.65	2.25	1.90
March	1.60	1.76	1.60	1.60	2.40	3.20	3.50	3.44	4.00	3.02	2.40	2.83	3.00	2.85	2.65	2.55	2.65	2.65	2.25	1.90
April	1.60	1.80	1.60	1.56	2.40	3.28	3.50	3.25	4.00	3.13	2.40	2.93	3.00	2.80	2.65	2.55	2.65	2.65	2.16	1.90
May	1.60	1.80	1.56	1.55	2.50	3.50	3.50	3.25	4.00	3.05	2.40	3.00	2.93	2.75	2.65	2.50	2.55	2.65	2.15	1.85
June	1.60	1.80	1.50	1.55	2.50	3.75	3.50	3.25	4.00	3.00	2.40	3.00	2.90	2.68	2.65	2.50	2.55	2.65	2.13	1.80
July	1.62	1.70	1.52	1.60	2.50	4.00	3.50	3.25	4.00	2.81	2.40	3.00	2.88	2.65	2.65	2.53	2.55	2.64	2.05	1.80
Aug.	1.66	1.65	1.56	1.61	2.58	4.00	3.50	3.25	4.25	2.75	2.48	3.00	2.81	2.65	2.65	2.55	2.55	2.55	2.04	1.88
Sept.	1.70	1.65	1.60	1.69	2.60	4.00	3.50	3.25	4.25	2.86	2.63	3.00	2.78	2.65	2.65	2.55	2.55	2.50	2.00	1.90
Oct.	1.70	1.63	1.60	1.80	2.63	...	3.50	3.31	4.25	2.90	2.70	3.00	2.75	2.63	2.65	2.54	2.55	2.43	1.99	1.90
Nov.	1.70	1.59	1.50	1.87	2.85	3.50	3.50	3.50	4.05	2.84	2.70	3.00	2.75	2.65	2.65	2.50	2.55	2.40	1.93	1.90
Dec.	1.72	1.55	1.51	2.04	3.00	3.50	3.50	4.12	3.25	2.69	2.70	3.00	2.85	2.65	2.65	2.50	2.63	2.40	1.90	1.93
Aver.	*1.64*	*1.70*	*1.56*	*1.67*	*2.53*	*3.52*	*3.50*	*3.41*	*4.09*	*2.96*	*2.51*	*2.94*	*2.89*	*2.72*	*2.65*	*2.54*	*2.58*	*2.57*	*2.10*	*1.88*


DOLLARS A GROSS TON
Cents per Pound
180
140
100
80
70
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4
3½
3
2¾
2½
2¼
2
1¾
1½
1¼
1
1915
1916
1917
1918
1919
TANK PLATES
WIRE NAILS
TANK PLATES
STEEL BARS
BILLETS
CINCINNATI
CHICAGO
BASIC
SCRAP
PLATES
WIRE NAILS
STEEL BARS
BILLETS
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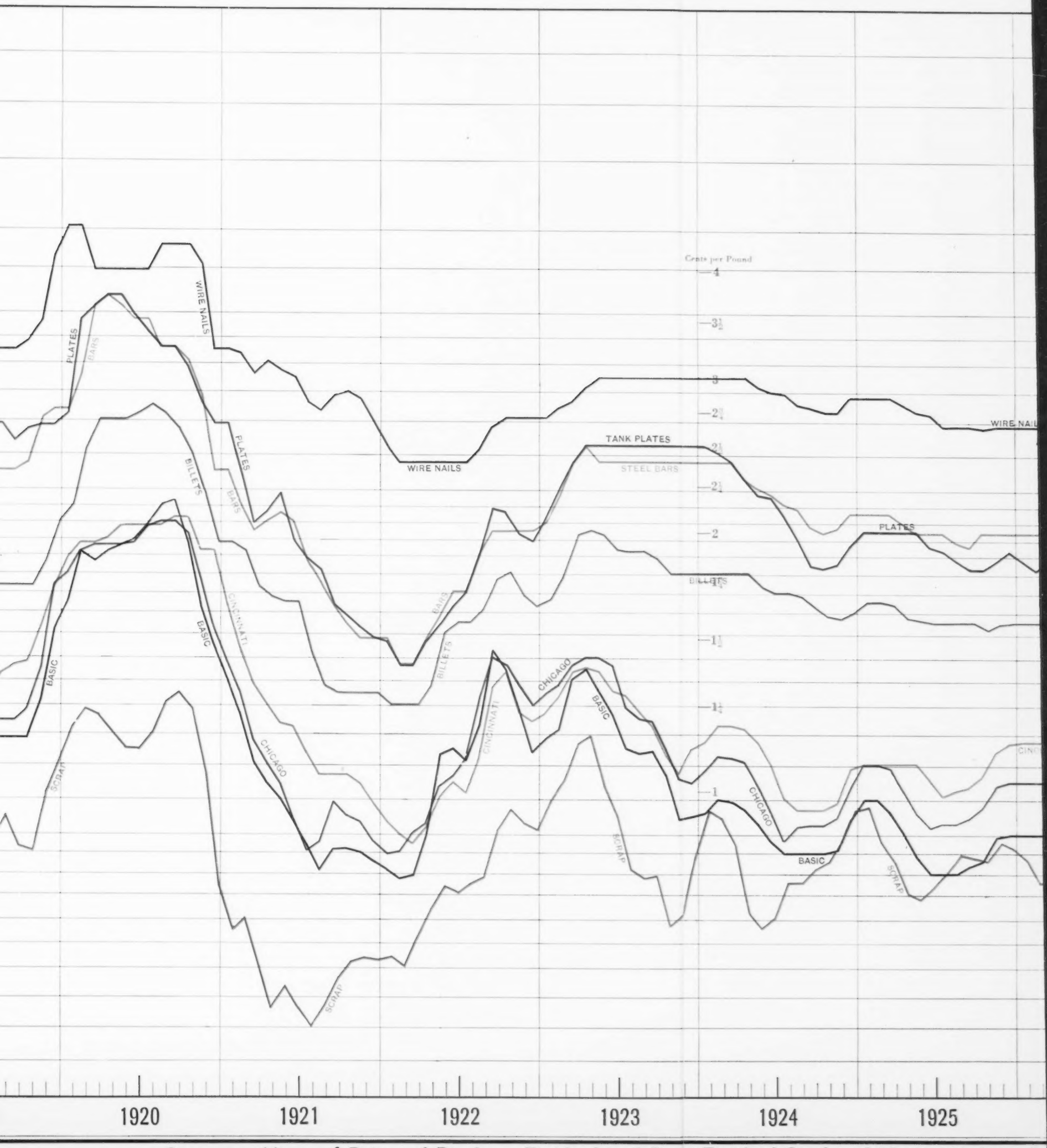
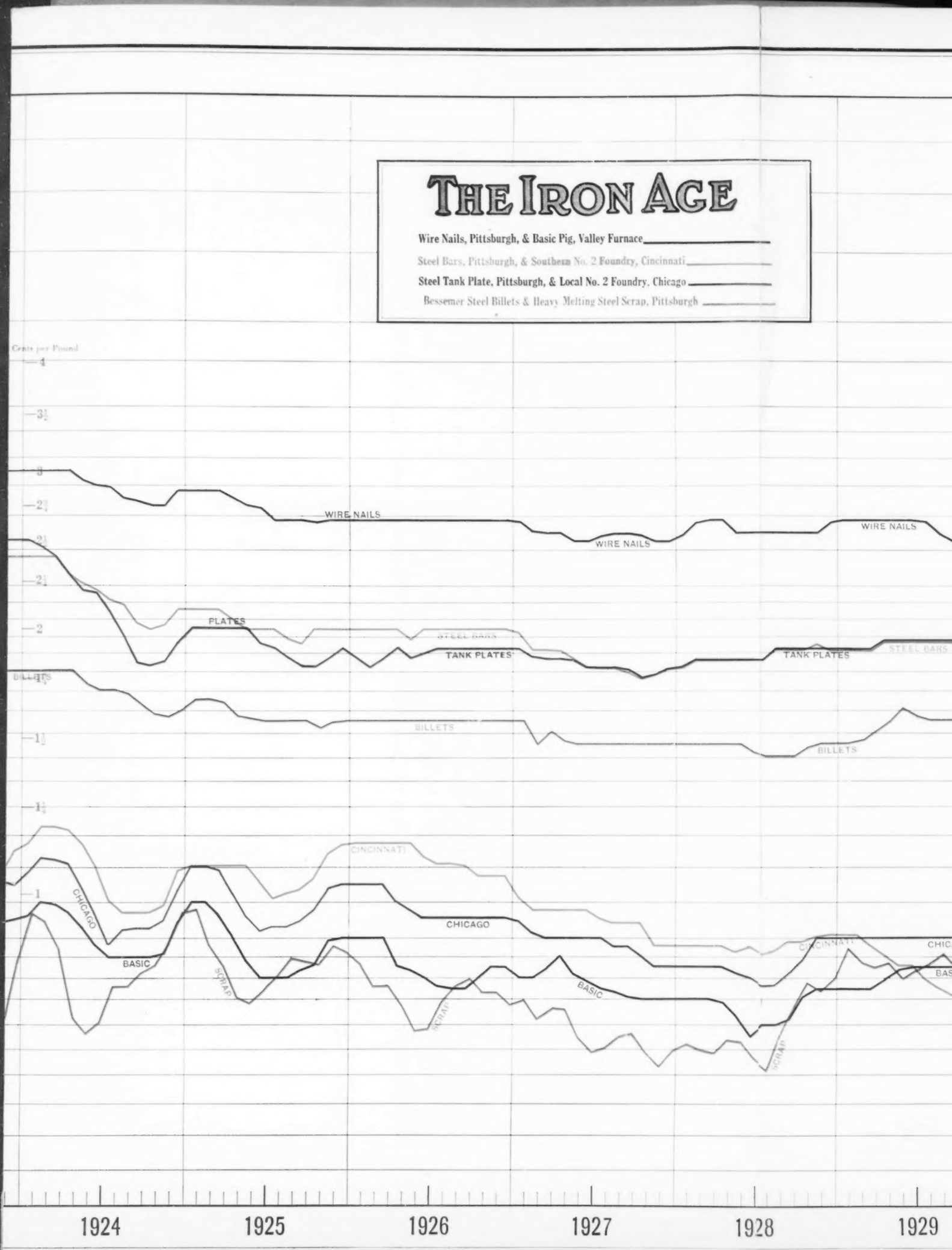
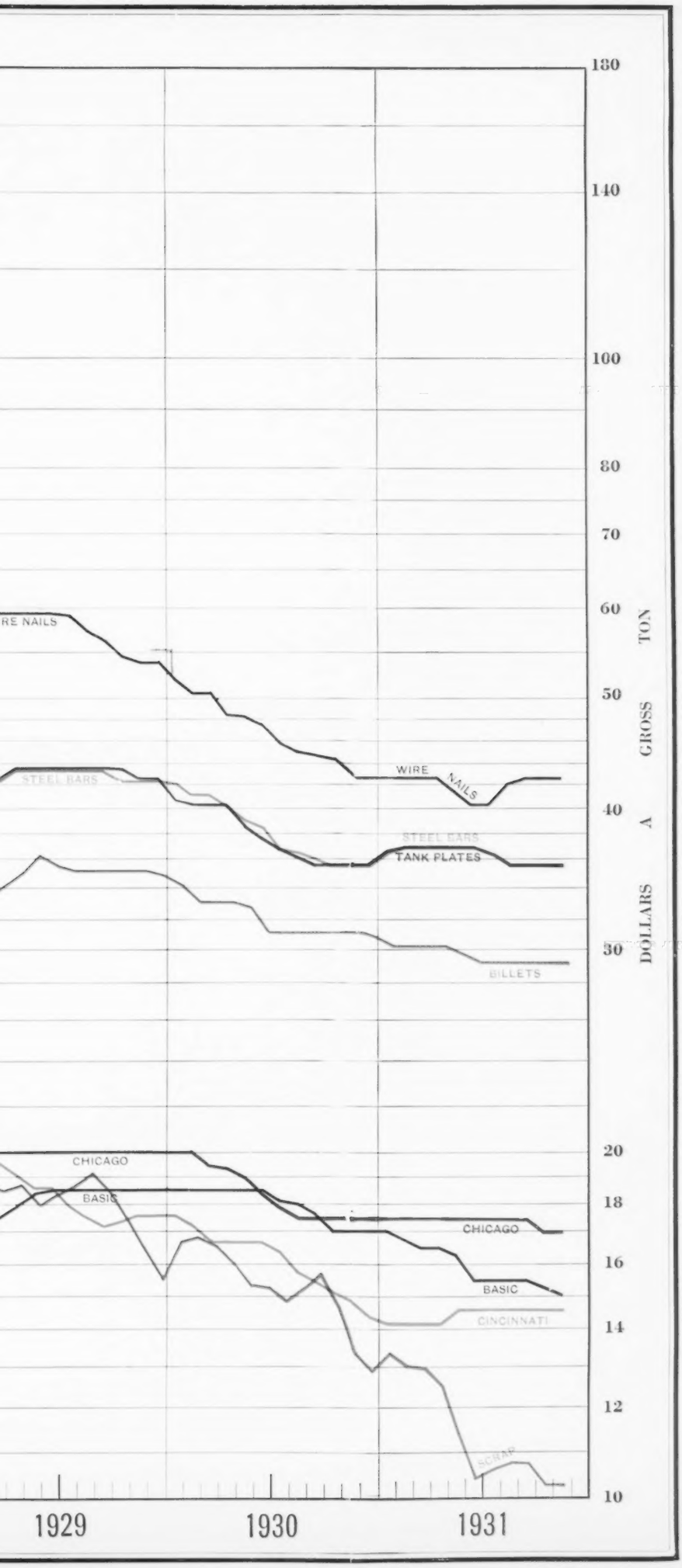
SCRAP



Seventeen Years of Prices of Pig Iron, Finished and Semi-Finished Steel and Heavy Melting Sc



ni-Finished Steel and Heavy Melting Scrap


130
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DOLLARS A GROSS TON
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STEEL BARS
WIRE NAILS
STEEL BARS
TANK PLATES
BILLETS
CHICAGO
BASIS
CHICAGO
BASIC
CINCINNATI
SCRAP
1929
1930
1931

Soft Steel Bars at Pittsburgh, Cents a Pound

	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan. ..	1.15	1.70	1.20	1.10	2.03	3.15	2.90	2.70	2.75	2.35	1.50	2.04	2.40	2.10	2.00	1.98	1.81	1.90	1.89	1.64
Feb. ..	1.12	1.70	1.20	1.10	2.31	3.25	2.90	2.70	3.00	2.15	1.39	2.20	2.40	2.10	2.00	1.90	1.85	1.90	1.85	1.65
March..	1.10	1.85	1.20	1.15	2.65	3.63	2.90	2.61	3.63	2.00	1.39	2.39	2.40	2.10	2.00	1.90	1.85	1.90	1.85	1.65
April ..	1.16	1.84	1.15	1.20	2.88	3.75	2.90	2.35	3.75	2.05	1.50	2.50	2.29	2.05	2.00	1.89	1.85	1.95	1.79	1.65
May ..	1.20	1.70	1.14	1.20	3.00	4.00	2.90	2.35	3.63	2.10	1.58	2.40	2.24	2.00	1.95	1.85	1.85	1.95	1.75	1.65
June ..	1.20	1.60	1.11	1.21	2.75	4.25	2.90	2.35	3.50	2.05	1.70	2.40	2.20	2.00	2.00	1.81	1.85	1.95	1.73	1.65
July ..	1.25	1.50	1.12	1.25	2.63	4.50	2.90	2.35	3.50	1.84	1.70	2.40	2.15	2.00	2.00	1.80	1.85	1.95	1.65	1.63
Aug. ..	1.30	1.40	1.19	1.30	2.56	4.30	2.90	2.35	3.25	1.74	1.88	2.40	2.13	1.95	2.00	1.80	1.90	1.95	1.64	1.60
Sept. ..	1.37	1.40	1.20	1.34	2.60	4.00	2.90	2.35	3.25	1.63	2.00	2.40	2.04	1.92	2.00	1.78	1.90	1.94	1.61	1.60
Oct. ...	1.45	1.39	1.15	1.44	2.75	2.90	2.90	2.39	3.13	1.55	2.00	2.40	2.00	2.00	2.00	1.75	1.91	1.90	1.60	1.60
Nov. ..	1.55	1.29	1.10	1.62	2.83	2.90	2.90	2.69	2.87	1.50	2.00	2.40	2.03	2.00	2.00	1.77	1.94	1.90	1.60	1.60
Dec. ..	1.66	1.21	1.07	1.84	3.00	2.90	2.80	2.75	2.35	1.50	2.00	2.40	2.10	2.00	2.00	1.80	1.90	1.90	1.60	1.58
Aver.	*1.29*	*1.55*	*1.15*	*1.31*	*2.67*	*3.63*	*2.89*	*2.50*	*3.22*	*1.87*	*1.72*	*2.36*	*2.20*	*2.02*	*2.00*	*1.84*	*1.87*	*1.92*	*1.71*	*1.63*

Tank Plates at Pittsburgh, Cents a Pound

	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan. ..	1.15	1.75	1.20	1.10	2.25	4.45	3.25	3.00	2.72	2.65	1.48	2.06	2.50	2.00	1.86	1.90	1.81	1.90	1.83	1.64
Feb. ..	1.11	1.71	1.20	1.10	2.56	4.88	3.25	3.00	3.50	2.33	1.39	2.23	2.45	2.00	1.80	1.86	1.85	1.90	1.80	1.65
March..	1.12	1.70	1.18	1.10	3.10	5.25	3.25	2.91	3.63	2.04	1.39	2.39	2.39	2.00	1.86	1.85	1.85	1.90	1.80	1.65
April ..	1.21	1.68	1.15	1.15	3.56	5.88	3.25	2.65	3.75	2.10	1.48	2.50	2.28	2.00	1.90	1.85	1.85	1.95	1.80	1.65
May ..	1.25	1.60	1.12	1.15	3.75	6.60	3.25	2.65	3.75	2.20	1.56	2.50	2.20	2.00	1.86	1.84	1.85	1.95	1.73	1.65
June ..	1.25	1.45	1.10	1.16	3.63	8.00	3.25	2.65	3.55	1.95	1.63	2.50	2.18	1.92	1.88	1.80	1.85	1.95	1.69	1.65
July ..	1.30	1.45	1.10	1.22	3.44	9.00	3.25	2.65	3.38	1.85	1.70	2.50	2.09	1.90	1.90	1.80	1.85	1.95	1.65	1.63
Aug. ..	1.35	1.44	1.18	1.26	3.70	8.80	3.25	2.65	3.25	1.78	1.88	2.50	1.95	1.85	1.90	1.80	1.90	1.95	1.61	1.60
Sept. ..	1.47	1.40	1.20	1.34	4.00	8.00	3.25	2.53	3.25	1.64	2.13	2.50	1.82	1.80	1.90	1.78	1.90	1.95	1.60	1.60
Oct. ...	1.53	1.36	1.14	1.44	4.00	3.25	3.25	2.61	3.09	1.60	2.11	2.50	1.80	1.80	1.90	1.75	1.90	1.94	1.60	1.60
Nov. ..	1.59	1.26	1.08	1.65	4.15	3.25	3.25	2.65	2.81	1.54	1.99	2.50	1.83	1.86	1.90	1.77	1.90	1.90	1.60	1.60
Dec. ..	1.60	1.20	1.05	2.04	4.25	3.25	3.13	2.65	2.65	1.50	1.95	2.50	1.92	1.90	1.90	1.80	1.90	1.90	1.60	1.54
Aver.	*1.33*	*1.50*	*1.14*	*1.31*	*3.53*	*5.88*	*3.24*	*2.72*	*3.28*	*1.93*	*1.72*	*2.43*	*2.12*	*1.91*	*1.88*	*1.82*	*1.87*	*1.93*	*1.69*	*1.62*

Structural Shapes at Pittsburgh, Cents a Pound

	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan. ..	1.15	1.75	1.20	1.10	1.90	3.25	3.00	2.80	2.47	2.45	1.50	2.06	2.50	2.10	1.90	1.98	1.81	1.90	1.83	1.64
Feb. ..	1.11	1.71	1.20	1.10	2.06	3.25	3.00	2.80	2.70	2.26	1.39	2.20	2.50	2.10	1.90	1.90	1.85	1.90	1.80	1.65
March..	1.15	1.70	1.19	1.10	2.40	3.54	3.00	2.71	3.13	2.08	1.39	2.39	2.39	2.10	1.90	1.90	1.85	1.90	1.80	1.65
April ..	1.21	1.68	1.15	1.20	2.55	3.88	3.00	2.45	3.25	2.10	1.50	2.50	2.29	2.05	1.90	1.88	1.85	1.95	1.80	1.65
May ..	1.25	1.50	1.14	1.20	2.60	4.00	3.00	2.45	3.10	2.20	1.56	2.50	2.24	2.00	1.90	1.80	1.85	1.95	1.73	1.65
June ..	1.25	1.45	1.11	1.20	2.53	4.31	3.00	2.45	3.10	2.10	1.63	2.50	2.20	2.00	1.94	1.80	1.85	1.95	1.69	1.65
July ..	1.30	1.45	1.12	1.25	2.50	4.50	3.00	2.45	3.10	1.93	1.70	2.50	2.09	2.00	2.00	1.80	1.85	1.95	1.65	1.63
Aug. ..	1.35	1.45	1.19	1.30	2.52	4.30	3.00	2.45	3.10	1.82	1.88	2.50	2.00	1.95	2.00	1.80	1.90	1.95	1.61	1.60
Sept. ..	1.42	1.41	1.20	1.35	2.64	4.00	3.00	2.45	3.10	1.64	2.00	2.50	2.00	1.90	2.00	1.78	1.90	1.94	1.60	1.60
Oct. ...	1.48	1.37	1.15	1.44	2.75	3.00	3.00	2.45	3.05	1.60	2.00	2.50	1.93	1.90	2.00	1.75	1.90	1.90	1.60	1.60
Nov. ..	1.57	1.29	1.10	1.60	2.86	3.00	3.00	2.45	2.89	1.54	2.00	2.50	2.00	1.90	2.00	1.77	1.90	1.90	1.60	1.60
Dec. ..	1.60	1.25	1.07	1.78	3.25	3.00	2.90	2.45	2.45	1.50	2.00	2.50	2.10	1.90	2.00	1.80	1.90	1.90	1.60	1.50
Aver.	*1.32*	*1.50*	*1.15*	*1.31*	*2.55*	*3.67*	*2.99*	*2.53*	*2.95*	*1.94*	*1.71*	*2.43*	*2.19*	*1.99*	*1.95*	*1.83*	*1.87*	*1.92*	*1.69*	*1.62*

No. 28 Hot-Rolled Annealed Sheets, at Pittsburgh, Cents a Pound

While No. 24 gage was made the base in 1926, this table has been continued at No. 28 gage, to preserve comparisons with past years.

	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan. ..	1.90	2.31	1.87	1.80	2.60	4.50	5.00	4.70	4.48	4.35	3.00	3.35	3.83	3.60	3.35	3.16	3.05	3.10	2.90	2.60
Feb. ..	1.87	2.35	1.95	1.80	2.60	4.69	5.00	4.70	5.00	4.21	3.00	3.46	3.85	3.50	3.28	3.05	3 15	3.10	2.86	2.60
March..	1.80	2.35	1.95	1.80	2.71	4.94	5.00	4.61	5.50	3.88	3.00	3.71	3.78	3.44	3.25	3.00	3.14	3.10	2.90	2.56
April ..	1.86	2.35	1.91	1.80	2.85	5.75	5.00	4.35	5.50	3.88	3.11	4.00	3.71	3.35	3.25	2.99	3.05	3.10	2.80	2.50
May ..	1.90	2.30	1.85	1.79	2.89	7.00	5.00	4.35	5.50	4.00	3.15	3.88	3.60	3.20	3.18	3.11	2.96	3.10	2.80	2.40
June ..	1.90	2.27	1.81	1.75	2.90	7.88	5.00	4.35	5.50	3.80	3.15	3.85	3.53	3.15	3.10	3.25	2.90	3.10	2.80	2.40
July ..	1.95	2.25	1.80	1.75	2.90	8.50	5.00	4.35	6.75	3.31	3.15	3.81	3.46	3.13	3.10	3.25	2.87	3.10	2.74	2.65
Aug. ..	2.02	2.21	1.86	1.85	2.90	8.50	5.00	4.35	7.50	2.90	3.23	3.75	3.45	3.15	3.10	3.25	2.90	3.10	2.69	2.65
Sept. ..	2.07	2.14	1.95	1.90	2.93	8.50	5.00	4.35	7.38	2.81	3.35	3.75	3.50	3.14	3.15	3.25	2.90	3.10	2.67	2.65
Oct. ...	2.21	2.04	1.94	2.03	3.23	...	5.05	4.35	6.69	3.00	3.47	3.75	3.50	3.11	3.23	3.15	3.00	3.02	2.61	2.65
Nov. ..	2.25	1.97	1.87	2.25	3.65	5.00	5.00	4.35	5.77	2.86	3.35	3.75	3.50	3.25	3.25	3.03	3.00	3.00	2.60	2.65
Dec. ..	2.25	1.89	1.82	2.50	4.31	5.00	4.85	4.35	4.35	3.00	3.35	3.75	3.54	3.33	3.25	3.03	3.08	3.00	2.60	2.60
Aver.	*2.00*	*2.20*	*1.88*	*1.92*	*3.04*	*6.39*	*4.99*	*4.43*	*5.83*	*3.50*	*3.19*	*3.73*	*3.60*	*3.28*	*3.21*	*3.13*	*3.00*	*3.08*	*2.75*	*2.58*

Automobile Body Sheets, Base No. 22 Gage, f.o.b. Pittsburgh, Cents a Pound

	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	5.45	5.20	4.35	4.70	5.35	4.75	4.50	4.18	4.00	4.10	3.90	3.30
Feb.	5.60	5.20	4.35	4.78	5.35	4.68	4.43	4.15	4.08	4.10	3.90	3.30
March	5.80	5.20	4.35	5.00	5.35	4.46	4.40	4.15	4.15	4.10	3.88	3.24
April	6.15	5.20	4.40	5.00	5.25	4.40	4.33	4.15	4.04	4.10	3.80	3.10
May	6.25	5.20	4.45	5.35	5.10	4.40	4.29	4.15	4.00	4.10	3.75	3.03
June	6.20	4.95	4.50	5.35	5.10	4.22	4.20	4.25	4.00	4.10	3.65	3.02
July	6.80	4.70	4.60	5.35	5.06	4.15	4.20	4.25	4.00	4.10	3.60	3.10
Aug.	6.95	4.65	4.75	5.35	4.75	4.25	4.20	4.25	4.00	4.08	3.60	3.10
Sept.	7.00	4.45	4.85	5.35	4.72	4.25	4.25	4.25	4.00	4.00	3.50	3.10
Oct.	7.00	4.55	4.85	5.35	4.60	4.29	4.25	4.15	4.00	4.00	3.45	3.10
Nov.	6.60	4.35	4.85	5.35	4.60	4.40	4.25	4.12	4.00	4.00	3.38	3.10
Dec.	5.25	4.35	4.70	5.35	4.75	4.50	4.25	4.00	4.08	3.98	3.30	3.02
Aver.	*6.25*	*4.83*	*4.58*	*5.19*	*5.00*	*4.39*	*4.30*	*4.17*	*4.03*	*4.06*	*3.64*	*3.13*

Blue Annealed Sheets, or Light Plates, No. 10 Gage, Cents a Pound at Pittsburgh

	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	3.65	3.55	2.25	2.52	3.00	2.70	2.50	2.25	2.10	2.10	2.10	1.90
Feb.	4.25	3.29	2.25	2.64	3.00	2.70	2.50	2.20	2.10	2.10	2.10	1.90
March	4.50	3.04	2.25	2.95	2.93	2.69	2.50	2.20	2.10	2.10	2.10	1.90
April	4.50	3.05	2.36	3.25	2.86	2.53	2.43	2.18	2.08	2.10	2.06	1.85
May	4.50	3.10	2.40	3.20	2.80	2.40	2.40	2.22	2.00	2.13	2.00	1.85
June	4.50	2.88	2.40	3.00	2.76	2.31	2.32	2.25	2.00	2.20	2.00	1.85
July	5.39	2.55	2.40	3.00	2.68	2.30	2.30	2.25	2.00	2.14	2.00	1.85
Aug.	6.00	2.31	2.44	3.00	2.63	2.30	2.30	2.25	2.00	2.10	1.93	1.85
Sept.	5.56	2.23	2.44	3.00	2.69	2.25	2.30	2.25	2.00	2.10	1.90	1.85
Oct.	4.98	2.25	2.60	3.00	2.70	2.26	2.30	2.14	2.00	2.10	1.90	1.85
Nov.	4.54	2.25	2.55	3.00	2.70	2.40	2.30	2.10	2.00	2.10	1.90	1.85
Dec.	3.55	2.25	2.50	3.00	2.70	2.50	2.30	2.10	2.08	2.18	1.90	1.80
Aver.	*4.65*	*2.73*	*2.41*	*2.96*	*2.79*	*2.45*	*2.37*	*2.20*	*2.04*	*2.12*	*1.99*	*1.86*

Wrought Iron and Steel Pipe Prices

Computed from list discounts, with "trimmings," for carload lots; price for base size pipe, ¾ to 3 in.

Steel Pipe, Net Ton

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$34.20	$41.39	$64.84	$88.92	$83.36	$80.64	$77.30	$51.87	$61.13	$70.30	$70.30	$70.30	$70.30	$68.60	$70.30	$70.30	$66.50
Feb.	35.42	43.63	66.95	88.92	83.36	83.36	76.88	51.87	66.50	70.30	70.30	70.30	70.30	68.60	70.30	70.30	66.50
March	36.10	47.51	72.07	88.92	81.06	83.36	76.88	51.87	66.50	70.30	70.30	70.30	70.30	68.60	70.30	70.30	66.50
April	36.10	51.25	81.51	88.92	76.88	83.36	71.63	51.87	68.02	70.30	70.30	70.30	70.30	69.88	70.30	66.50	66.50
May	38.00	53.72	92.62	88.92	76.88	83.36	67.62	51.87	70.30	70.30	70.30	70.30	70.30	70.30	70.30	66.50	63.59
June	38.00	53.72	95.21	88.92	76.88	83.36	67.62	51.87	70.30	70.30	70.30	70.30	70.30	70.30	70.30	66.50	64.84
July	38.00	53.72	105.59	88.92	76.88	83.36	64.63	51.87	70.30	70.30	70.30	70.30	70.30	70.30	70.30	66.50	64.84
Aug.	38.00	53.72	105.59	88.92	76.88	83.36	63.91	54.74	70.30	70.30	70.30	70.30	70.30	70.30	70.30	66.50	64.84
Sept.	38.00	55.21	105.59	88.92	76.88	83.36	60.21	57.43	70.30	70.30	70.30	70.30	70.30	70.30	70.30	66.50	64.84
Oct.	38.00	55.58	105.59	88.92	76.88	83.36	56.50	58.74	70.30	70.30	70.30	70.30	68.54	70.30	70.30	66.50	64.84
Nov.	39.90	56.57	91.70	88.92	76.88	83.36	56.50	61.13	70.30	70.30	70.30	70.30	66.79	70.30	70.30	66.50	64.84
Dec.	39.90	61.01	88.92	88.92	76.88	83.36	53.96	61.13	70.30	70.30	70.30	70.30	66.79	70.30	70.30	66.50	64.84
Aver.	*37.47*	*52.25*	*81.73*	*88.92*	*78.31*	*83.13*	*66.14*	*54.69*	*68.71*	*70.30*	*70.30*	*70.30*	*69.57*	*69.84*	*70.30*	*67.45*	*65.29*

Wrought Iron Pipe, Net Ton

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$51.30	$58.64	$83.36	$122.27	$116.71	$115.60	$135.06	$100.96	$122.56	$131.10	$131.10	$127.82	$127.82	$127.82	$118.56	$118.56	$118.56
Feb.	51.30	62.16	85.48	122.27	116.71	119.49	136.16	100.96	127.82	131.10	131.10	127.82	127.82	127.82	118.56	118.56	118.56
March	51.30	66.03	90.65	122.27	114.41	119.49	136.16	100.96	127.82	131.10	127.82	127.82	127.82	127.82	118.56	118.56	118.56
April	51.30	69.78	101.89	122.27	110.22	119.49	125.66	100.96	129.02	131.10	127.82	127.82	127.82	127.82	118.56	118.56	118.56
May	53.20	72.25	113.00	122.27	110.22	119.49	117.63	100.96	131.10	131.10	127.82	127.82	127.82	127.82	118.56	118.56	118.56
June	53.20	72.25	114.85	122.27	110.22	119.49	117.63	100.96	131.10	131.10	127.82	127.82	127.82	127.82	118.56	118.56	118.56
July	53.20	72.25	122.27	122.27	110.22	119.49	111.65	100.96	131.10	131.10	127.82	127.82	127.82	127.82	118.56	118.56	118.56
Aug.	53.20	72.25	122.27	122.27	110.22	119.49	110.22	105.74	131.10	131.10	127.82	127.82	127.82	127.82	118.56	118.56	118.56
Sept.	53.20	73.73	122.27	122.27	110.22	119.49	105.59	116.33	131.10	131.10	127.82	127.82	127.82	127.82	118.56	118.56	118.56
Oct.	53.20	74.10	122.27	122.27	110.22	119.49	100.96	120.41	131.10	131.10	127.82	127.82	127.82	127.82	118.56	118.56	118.56
Nov.	55.10	75.07	122.27	122.27	110.22	119.49	100.96	120.41	131.10	131.10	127.82	127.82	127.82	127.82	118.56	118.56	118.56
Dec.	55.10	79.50	122.27	122.27	110.22	119.49	100.96	120.41	131.10	131.10	127.82	127.82	127.82	127.82	118.56	118.56	118.56
Aver.	*52.88*	*70.67*	*110.24*	*122.27*	*111.65*	*119.16*	*116.55*	*107.50*	*129.67*	*131.10*	*128.37*	*127.82*	*127.82*	*127.82*	*118.56*	*118.56*	*118.56*

Cast Iron Pipe Prices, 1915 to 1931

At New York, 6-In., Net Ton

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$20.00	$29.00	$41.50	$55.35	$65.70	$66.30	$63.30	$47.30	$54.90	$61.60	$54.60	$50.60	$48.60	$37.25	$39.60	$36.10	$37.90
Feb.	20.00	29.33	41.50	55.35	62.70	70.30	63.30	47.30	56.50	61.60	54.60	50.60	48.60	37.25	39.35	38.60	37.90
March	20.00	29.75	43.10	55.35	62.70	71.30	63.30	47.68	57.75	61.60	53.00	50.60	47.20	37.25	38.60	38.75	37.90
April	21.60	30.50	50.88	55.35	57.70	73.90	63.30	48.80	58.50	61.60	52.60	50.60	47.35	36.25	37.40	39.50	35.40
May	22.00	30.50	55.50	56.60	54.45	76.30	62.05	49.60	58.50	61.60	50.85	50.60	45.80	37.60	35.85	39.90	34.15
June	22.25	30.50	60.75	61.44	52.03	76.30	54.30	50.80	61.35	61.60	50.60	50.60	44.42	37.60	35.10	39.90	33.70
July	22.50	30.50	65.50	61.75	50.46	76.30	52.30	53.50	62.30	60.60	50.60	50.60	42.75	37.60	33.20	39.30	32.90
Aug.	23.25	30.50	65.50	61.75	52.33	76.53	46.05	54.10	62.62	59.60	50.60	50.60	39.65	36.60	33.60	38.90	32.90
Sept.	24.37	30.83	65.50	61.75	54.30	77.22	46.30	54.50	63.60	56.60	50.60	49.85	37.25	35.60	33.60	38.90	32.90
Oct.	25.25	31.50	61.00	67.70	55.30	77.22	47.30	54.50	63.60	56.35	50.60	49.60	36.50	35.60	34.60	38.90	32.90
Nov.	26.50	35.50	56.50	67.70	58.30	77.22	47.30	54.50	63.60*	55.60	50.60	49.60	36.25	37.32	34.60	38.65	32.90
Dec.	27.60	41.00	56.50	67.70	61.30	68.87	47.30	54.75	63.60*	55.20	50.60	49.10	37.00	39.40	34.60	37.90	32.50
Aver.	*22.94*	*31.62*	*55.31*	*60.65*	*57.27*	*73.98*	*54.68*	*51.44*	*60.57*	*59.46*	*51.65*	*50.25*	*42.61*	*37.11*	*35.84*	*38.78*	*34.50*

*Concession of $2 to $3 a ton from this price to consumers willing to accept winter delivery.

Cast Iron Pipe, Delivered Chicago, 6-In. and Larger, Net Ton

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$23.50	$29.00	$41.50	$54.30	$64.30	$67.55	$64.10	$42.50	$51.80	$56.20	$48.70	$49.20	$44.33	$35.00	$43.33	$42.20	$43.00
Feb.	23.50	29.50	41.75	54.30	61.80	71.30	64.10	41.60	53.20	56.20	49.95	49.20	43.70	35.83	44.45	44.95	44.00
March	23.50	29.50	43.00	54.30	60.55	72.80	64.10	42.10	54.20	56.20	47.60	49.20	44.20	35.70	44.70	45.20	43.20
April	23.50	30.50	53.00	54.30	56.80	74.80	64.10	42.85	57.20	56.20	46.70	49.20	43.95	36.20	44.20	45.20	43.00
May	23.50	30.50	55.50	55.81	54.30	76.80	60.10	44.60	60.20	55.20	47.07	49.20	43.20	37.80	44.20	45.15	43.00
June	23.70	30.50	60.75	60.83	51.80	76.80	52.85	46.10	60.20	55.20	47.70	48.90	42.70	40.20	45.20	45.00	42.20
July	24.00	30.50	65.50	62.05	52.60	76.80	48.85	45.57	60.20	54.80	48.20	47.95	41.58	40.80	45.20	45.00	42.00
Aug.	24.00	30.50	65.50	61.80	55.30	78.18	43.20	46.40	60.20	53.45	49.20	48.30	37.40	42.20	45.20	44.75	42.00
Sept.	24.70	31.00	65.50	61.80	55.80	82.10	42.60	47.45	59.95	51.80	49.20	47.58	34.58	42.20	45.20	43.60	42.00
Oct.	25.75	31.50	53.50	66.80	59.00	83.10	42.60	51.20	57.40	49.70	49.20	47.20	34.20	43.00	43.70	44.00	41.60
Nov.	27.00	36.25	54.25	66.80	59.80	83.10	42.90	51.20	55.45	48.20	50.20	46.70	34.50	45.20	43.70	44.00	40.50
Dec.	27.77	41.00	55.21	66.80	64.40	68.60	43.10	51.20	55.20	47.60	50.20	46.70	35.08	43.10	43.70	43.60	40.20
Aver.	*24.54*	*31.69*	*54.58*	*59.99*	*58.04*	*76.00*	*52.72*	*46.06*	*57.10*	*53.35*	*48.66*	*48.32*	*39.95*	*39.77*	*44.39*	*44.39*	*42.23*

Hot-Rolled and Cold-Rolled Strip Steel

Cents a Pound, at Pittsburgh, over 6 in. wide

Hot-Rolled Strip Steel

	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	...	4.50	3.30	3.45	3.30	2.00	2.75	3.00	2.25	2.30	2.34	2.01	1.80	1.80	1.55
Feb.	...	4.50	3.30	4.63	3.11	1.84	2.86	3.00	2.35	2.30	2.21	2.08	1.80	1.80	1.55
March	...	4.50	3.30	5.00	2.93	1.81	3.18	2.93	2.40	2.30	2.30	2.10	1.80	1.79	1.55
April	...	4.50	3.30	5.25	2.76	1.98	3.30	2.75	2.40	2.30	2.30	2.10	1.90	1.70	1.55
May	...	4.25	3.30	5.50	2.53	2.20	3.30	2.75	2.20	2.30	2.30	1.96	1.90	1.70	1.55
June	...	3.50	3.05	5.50	2.50	2.40	3.23	2.50	2.20	2.30	2.30	1.85	1.90	1.69	1.55
July	...	3.50	3.05	5.50	2.46	2.50	3.00	2.50	2.20	2.30	2.30	1.85	1.90	1.65	1.55
Aug.	...	3.50	3.31	5.50	2.23	2.60	3.00	2.35	2.20	2.30	2.30	1.85	1.90	1.65	1.55
Sept.	...	3.50	3.30	5.50	2.00	2.75	3.00	2.25	2.20	2.30	2.30	1.85	1.90	1.65	1.55
Oct.	...	3.50	3.30	5.25	2.00	2.90	3.00	2.25	2.23	2.30	2.19	1.85	1.90	1.60	1.54
Nov.	4.50	3.50	3.30	4.70	2.00	2.83	3.00	2.25	2.30	2.30	2.19	1.88	1.90	1.58	1.50
Dec.	4.50	3.50	3.30	3.65	2.00	2.75	2.88	2.25	2.30	2.30	2.03	1.80	1.90	1.55	1.49
Aver.	...	*3.90*	*3.26*	*4.95*	*2.49*	*2.38*	*3.04*	*2.57*	*2.27*	*2.30*	*2.26*	*1.93*	*1.88*	*1.68*	*1.54*

Cold-Rolled Strip Steel

	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	7.00	6.50	6.25	6.00	6.25	3.50	4.50	5.00	4.00	3.90	2.95	3.00	2.85	2.65	2.25
Feb.	7.25	6.50	6.25	7.00	6.06	3.50	4.69	4.75	4.00	3.90	2.80	3.00	2.85	2.65	2.25
March	7.63	6.50	6.10	7.00	5.83	3.50	5.00	4.75	4.00	3.90	2.92	3.00	2.80	2.60	2.25
April	7.31	6.50	5.65	7.75	5.54	3.61	5.25	4.75	4.00	3.79	3.00	3.00	2.75	2.55	2.23
May	7.60	6.50	5.65	8.50	4.98	3.71	5.25	4.50	3.94	3.75	3.00	3.00	2.75	2.50	2.15
June	8.63	6.50	5.65	8.50	4.88	4.00	5.19	4.50	3.53	3.72	3.19	3.00	2.75	2.45	2.15
July	9.00	6.50	5.65	8.50	4.25	4.00	5.00	4.30	3.63	3.60	3.25	2.92	2.75	2.45	2.15
Aug.	9.00	6.50	5.65	8.50	3.96	4.10	5.00	4.13	3.75	3.60	3.25	2.90	2.75	2.35	2.15
Sept.	9.00	6.50	5.65	8.50	3.78	4.25	5.00	4.00	3.75	3.50	3.25	2.72	2.75	2.35	2.15
Oct.	9.00	6.50	5.65	8.25	3.75	4.50	5.00	4.00	3.75	3.25	3.00	2.75	2.75	2.35	2.13
Nov.	6.75	6.50	5.65	8.00	3.75	4.50	4.98	4.00	3.90	3.25	3.00	2.85	2.75	2.33	2.05
Dec.	6.50	6.35	5.93	6.63	3.75	4.50	4.91	4.00	3.90	3.00	3.00	2.85	2.75	2.25	2.03
Aver.	*7.89*	*6.49*	*5.81*	*7.76*	*4.73*	*3.97*	*4.98*	*4.39*	*3.85*	*3.69*	*3.05*	*2.92*	*2.77*	*2.46*	*2.16*

Nine Years of Finished Iron and Steel, Chicago and Pittsburgh

Sheets, Bars and Beams at Chicago—Rivets and Cold-Finished Bars at Pittsburgh—Cotton Ties

Hot-Rolled Annealed Sheets, No. 28 Gage, at Chicago District Mill, Cents a Pound

	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	3.69	4.17	3.75	3.50	3.45	3.28	3.25	3.10	2.70
Feb.	3.69	4.19	3.75	3.50	3.23	3.30	3.25	3.05	2.70
March ..	3.90	4.14	3.75	3.50	3.25	3.30	3.35	3.05	2.66
April ...	4.25	4.03	3.65	3.48	3.25	3.26	3.35	2.95	2.60
May	4.19	3.99	3.48	3.40	3.37	3.12	3.35	2.95	2.60
June	4.19	3.99	3.32	3.31	3.40	3.08	3.35	2.95	2.60
July	4.19	3.84	3.35	3.30	3.40	3.05	3.35	2.94	2.75
Aug.	4.19	3.84	3.35	3.30	3.40	3.05	3.30	2.80	2.75
Sept. ...	4.12	3.93	3.35	3.33	3.40	3.05	3.25	2.77	2.75
Oct.	4.09	3.65	3.31	3.43	3.30	3.11	3.25	2.78	2.75
Nov. ...	4.09	3.68	3.43	3.50	3.19	3.15	3.13	2.70	2.75
Dec. ...	4.09	3.75	3.50	3.50	3.15	3.18	3.05	2.70	2.70
Aver...	*4.06*	*3.93*	*3.50*	*3.42*	*3.32*	*3.16*	*3.27*	*2.90*	*2.69*

Galvanized Steel Sheets, No. 28 Gage, at Chicago District Mill, Cents a Pound

	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	4.69	5.34	4.90	4.75	4.53	4.38	4.25	4.10	3.50
Feb.	4.69	5.34	4.90	4.75	4.40	4.40	4.25	3.90	3.50
March ..	5.02	5.29	4.88	4.75	4.40	4.40	4.35	3.90	3.50
April ...	5.28	5.21	4.75	4.75	4.40	4.36	4.35	3.90	3.40
May	5.34	5.12	4.55	4.68	4.48	4.25	4.35	3.83	3.40
June ...	5.34	5.14	4.39	4.55	4.50	4.20	4.35	3.79	3.37
July	5.34	5.00	4.38	4.45	4.50	4.15	4.35	3.75	3.50
Aug.	5.34	4.94	4.39	4.45	4.50	4.15	4.20	3.68	3.50
Sept. ...	5.34	5.00	4.40	4.44	4.50	4.15	4.15	3.60	3.50
Oct.	5.34	4.75	4.41	4.54	4.45	4.15	4.15	3.60	3.50
Nov. ...	5.22	4.79	4.68	4.60	4.35	4.15	4.10	3.60	3.50
Dec. ...	5.24	4.90	4.75	4.60	4.20	4.18	4.00	3.54	3.46
Aver...	*5.18*	*5.07*	*4.62*	*4.61*	*4.43*	*4.24*	*4.24*	*3.77*	*3.47*

Blue Annealed Sheets, Nos. 9 and 10 Gage, at Chicago District Mill, Cents a Pound

	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	2.84	3.34	2.85	2.65	2.56	2.24	2.25	2.30	2.00
Feb.	2.84	3.34	2.85	2.65	2.36	2.25	2.25	2.25	2.00
March ..	3.03	3.29	2.83	2.65	2.39	2.25	2.35	2.25	2.00
April ...	3.32	3.21	2.75	2.65	2.40	2.24	2.35	2.25	1.95
May	3.34	3.14	2.55	2.65	2.40	2.20	2.35	2.23	1.95
June ...	3.34	3.14	2.44	2.49	2.40	2.18	2.50	2.15	1.95
July	3.34	3.07	2.48	2.45	2.40	2.15	2.50	2.15	1.95
Aug.	3.34	3.04	2.45	2.45	2.40	2.15	2.35	2.10	1.95
Sept. ...	3.34	3.10	2.45	2.45	2.40	2.15	2.35	2.10	1.95
Oct.	3.34	2.85	2.45	2.53	2.38	2.15	2.35	2.10	1.95
Nov. ...	3.34	2.85	2.58	2.55	2.27	2.15	2.35	2.03	1.95
Dec. ...	3.34	2.85	2.65	2.55	2.15	2.18	2.30	2.00	1.90
Aver...	*3.23*	*3.10*	*2.61*	*2.56*	*2.38*	*2.19*	*2.35*	*2.16*	*1.96*

Rail Steel Bars at Chicago District Mill, Cents a Pound

	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	2.00	2.30	2.03	2.00	1.90	1.80	1.90	1.88	1.60
Feb.	2.10	2.30	2.10	2.00	1.90	1.80	1.95	1.80	1.60
March ..	2.28	2.30	2.10	2.00	1.90	1.80	1.95	1.85	1.60
April ...	2.33	2.30	2.10	2.00	1.90	1.83	1.95	1.81	1.60
May	2.30	2.20	2.10	1.98	1.90	1.85	1.95	1.80	1.60
June ...	2.28	2.15	2.02	1.96	1.90	1.86	1.95	1.75	1.60
July	2.30	2.10	2.00	1.98	1.90	1.85	1.95	1.75	1.60
Aug.	2.30	2.05	2.00	2.00	1.90	1.85	1.95	1.65	1.60
Sept. ...	2.30	2.00	2.00	2.00	1.90	1.85	1.95	1.65	1.60
Oct.	2.30	2.00	2.00	2.00	1.83	1.95	1.95	1.65	1.54
Nov. ...	2.30	2.00	2.00	1.96	1.80	1.95	1.94	1.64	1.50
Dec. ...	2.30	2.00	2.00	1.90	1.80	1.95	1.90	1.60	1.50
Aver...	*2.25*	*2.14*	*2.04*	*1.98*	*1.88*	*1.86*	*1.94*	*1.74*	*1.58*

Cotton Tie Prices for Twenty-Seven Years

(Bundle of 45-Lb., f.o.b. Pittsburgh)

1905.....	$0.85	1914.....	$0.65	1923.....	$1.60
1906.....	0.85	1915.....	0.85	1924.....	*1.40
1907.....	0.95	1916.....	1.35	1925.....	†1.25
1908.....	0.85	1917.....	2.10	1926.....	‡1.20
1909.....	0.70	1918.....	2.10	1927.....	**1.20
1910.....	0.75	1919.....	1.70	1928.....	(a)1.27
1911.....	0.75	1920.....	2.00	1929.....	*1.05
1912.....	0.70	1921.....	1.30	1930.....	*0.87
1913.....	0.80	1922.....	1.10		

*F.o.b. Atlantic and Gulf ports.
†F.o.b. Gulf ports; $1.28, f.o.b. Atlantic ports.
‡F.o.b. Gulf ports; $1.22, f.o.b. Atlantic ports.
**F.o.b. Gulf ports; $1.21, f.o.b. Atlantic ports.
(a)In lots of 2000 bundles, $1.25; larger lots, $1.23.

Common Bar Iron at Chicago, Cents a Pound

	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	2.35	2.40	2.00	2.00	2.00	1.90	2.00	1.98	1.71
Feb.	2.46	2.40	2.03	2.00	2.00	1.93	2.00	1.95	1.73
March ..	2.53	2.40	2.10	2.00	2.00	2.00	2.04	1.95	1.70
April ...	2.60	2.35	2.10	2.00	2.00	2.00	2.05	1.92	1.74
May	2.60	2.28	2.08	2.00	2.00	2.00	2.05	1.90	1.70
June ...	2.55	2.23	2.01	2.00	2.00	2.00	2.05	1.90	1.70
July	2.50	2.20	1.96	2.00	2.00	2.00	2.05	1.90	1.70
Aug.	2.40	2.18	1.90	2.00	2.00	2.00	2.05	1.75	1.70
Sept. ...	2.39	2.14	1.90	2.00	1.98	2.00	2.05	1.74	1.70
Oct.	2.38	2.10	1.90	2.00	1.88	2.00	2.04	1.70	1.70
Nov. ...	2.40	2.08	1.94	2.00	1.88	2.00	2.00	1.70	1.70
Dec. ...	2.40	2.01	2.00	2.00	1.90	2.00	2.00	1.70	1.60
Aver...	*2.47*	*2.23*	*1.99*	*2.00*	*1.97*	*1.99*	*2.03*	*1.84*	*1.70*

Soft Steel Bars at Chicago, Cents a Pound

	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	2.08	2.50	2.13	2.10	2.10	1.91	2.00	1.99	1.71
Feb.	2.21	2.50	2.20	2.10	2.03	1.95	2.01	1.95	1.72
March ..	2.45	2.50	2.20	2.10	2.00	1.98	2.05	1.95	1.70
April ...	2.84	2.38	2.15	2.10	2.00	2.00	2.05	1.91	1.75
May	2.74	2.30	2.10	2.10	2.00	2.00	2.05	1.85	1.70
June ...	2.60	2.25	2.10	2.10	2.00	2.00	2.05	1.83	1.70
July	2.60	2.19	2.10	2.10	2.00	2.00	2.05	1.75	1.70
Aug.	2.60	2.13	2.10	2.10	1.98	2.00	2.05	1.75	1.70
Sept. ...	2.50	2.02	2.10	2.10	1.90	2.00	2.05	1.71	1.70
Oct.	2.50	2.00	2.10	2.10	1.85	2.00	2.03	1.70	1.70
Nov. ...	2.50	2.05	2.10	2.10	1.87	2.00	2.00	1.70	1.70
Dec. ...	2.50	2.10	2.10	2.10	1.90	2.00	2.00	1.70	1.60
Aver...	*2.51*	*2.24*	*2.12*	*2.10*	*1.97*	*1.99*	*2.03*	*1.82*	*1.70*

Structural Steel Beams at Chicago, Cents a Pound

	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	2.18	2.60	2.23	2.10	2.10	1.91	2.00	1.99	1.71
Feb.	2.31	2.60	2.30	2.10	2.03	1.95	2.01	1.95	1.72
March ..	2.52	2.60	2.30	2.10	2.00	1.98	2.05	1.94	1.70
April ...	2.84	2.50	2.25	2.10	2.00	2.00	2.05	1.90	1.75
May	2.84	2.45	2.20	2.10	2.00	2.00	2.05	1.83	1.70
June ...	2.70	2.39	2.18	2.10	2.00	2.00	2.05	1.79	1.70
July	2.70	2.27	2.10	2.10	2.00	2.00	2.05	1.75	1.70
Aug.	2.70	2.20	2.10	2.10	1.94	2.00	2.05	1.75	1.70
Sept. ...	2.60	2.06	2.10	2.10	1.90	2.00	2.05	1.71	1.70
Oct.	2.60	2.00	2.10	2.10	1.85	2.00	2.03	1.70	1.70
Nov.	2.60	2.15	2.10	2.10	1.87	2.00	2.00	1.70	1.70
Dec.	2.60	2.20	2.10	2.10	1.90	2.00	2.00	1.70	1.60
Aver...	*2.59*	*2.33*	*2.17*	*2.10*	*1.97*	*1.99*	*2.03*	*1.81*	*1.70*

Cold-Finished Steel Bars, Base 100 Pounds, f.o.b. Pittsburgh

	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$2.53	$3.00	$2.80	$2.50	$2.30	$2.20	$2.20	$2.15	$2.08
Feb.	2.73	2.95	2.80	2.50	2.30	2.20	2.20	2.10	2.10
March ..	2.85	2.98	2.72	2.50	2.38	2.20	2.20	2.10	2.10
April ...	3.00	3.00	2.70	2.50	2.40	2.20	2.30	2.10	2.10
May	3.25	2.90	2.70	2.50	2.40	2.20	2.30	2.10	2.10
June ...	3.25	2.90	2.60	2.50	2.33	2.20	2.30	2.10	2.10
July	3.25	2.84	2.60	2.50	2.20	2.10	2.30	2.10	2.10
Aug.	3.25	2.80	2.50	2.50	2.20	2.10	2.30	2.10	2.10
Sept. ...	3.25	2.74	2.46	2.50	2.15	2.10	2.30	2.10	2.10
Oct.	3.10	2.70	2.40	2.40	2.10	2.16	2.30	2.10	2.10
Nov.	2.95	2.70	2.48	2.30	2.10	2.20	2.30	2.00	2.10
Dec.	3.00	2.78	2.50	2.30	2.10	2.20	2.30	2.00	2.02
Aver...	*3.03*	*2.86*	*2.61*	*2.46*	*2.25*	*2.17*	*2.28*	*2.09*	*2.09*

Large Structural Rivets, Base 100 Pounds, f.o.b. Pittsburgh

	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$3.00	$2.90	$2.60	$2.60	$2.34	$2.75	$2.90	$3.10	$2.75
Feb.	3.00	2.75	2.60	2.53	2.30	2.75	2.90	3.10	2.75
March ..	3.25	2.75	2.60	2.50	2.30	2.90	2.90	3.10	2.75
April ...	3.25	2.65	2.58	2.50	2.75	2.90	3.06	3.10	2.75
May	3.25	2.65	2.45	2.50	2.75	2.90	3.10	2.95	2.75
June ...	3.25	2.61	2.40	2.50	2.75	2.90	3.10	2.90	2.75
July	3.13	2.60	2.40	2.50	2.75	2.90	3.10	2.90	2.75
Aug.	3.00	2.55	2.40	2.50	2.75	2.90	3.10	2.79	2.75
Sept. ...	2.95	2.60	2.40	2.48	2.75	2.90	3.10	2.75	2.55
Oct.	2.75	2.58	2.40	2.45	2.75	2.90	3.10	2.75	2.25
Nov.	2.68	2.60	2.60	2.45	3.00	2.90	3.10	2.75	2.25
Dec.	2.90	2.60	2.60	2.40	2.75	2.90	3.10	2.75	2.25
Aver...	*3.02*	*2.65*	*2.50*	*2.50*	*2.66*	*2.88*	*3.05*	*2.91*	*2.61*

Monthly Averages of Ferroalloy Quotations

Ferromanganese (80 *Per Cent*), *Gross Ton, at Seaboard*

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$68.00	$150.00	$175.00	$250.00	$255.00	$146.00	$112.50	$58.35	$105.00	$108.70	$112.50	$115.00	$100.00	$100.00	$105.00	$100.00	$80.00
Feb.	69.75	207.50	231.25	250.00	215.00	172.50	100.00	60.42	107.50	107.50	115.00	115.00	100.00	100.00	105.00	95.50	80.00
March	100.00	349.60	290.00	250.00	175.00	216.25	96.00	62.50	113.75	107.50	115.00	97.60	100.00	100.00	105.00	94.00	80.00
April	100.00	406.25	362.50	290.00	150.00	240.00	90.00	64.37	120.00	107.50	115.00	88.00	100.00	100.00	105.00	94.00	80.00
May	100.00	387.50	420.50	290.00	138.40	250.00	85.00	66.87	128.00	107.50	115.00	88.00	94.00	103.00	105.00	94.00	80.00
June	100.00	270.00	443.75	290.00	121.00	225.00	80.00	67.50	128.75	107.50	115.00	88.00	90.00	105.00	105.00	94.00	80.00
July	109.00	175.00	406.25	290.00	111.00	225.00	70.60	67.50	•119.50	106.50	115.00	88.00	90.00	105.00	105.00	94.00	80.00
Aug.	127.25	172.00	400.00	290.00	101.25	198.75	70.00	67.50	117.50	95.75	115.00	88.00	90.00	105.00	105.00	94.00	80.00
Sept.	117.00	169.75	387.50	285.00	98.75	170.00	65.80	75.63	•111.25	90.00	115.00	88.00	90.00	105.00	105.00	94.00	80.00
Oct.	105.00	162.25	310.00	285.00	105.00	170.00	63.00	100.00	•110.00	90.00	115.00	88.00	90.00	105.00	105.00	94.00	80.00
Nov.	105.00	160.80	256.00	285.00	112.50	170.00	61.50	100.00	•108.75	98.75	115.00	96.60	90.00	105.00	105.00	94.00	80.00
Dec.	106.00	169.75	243.75	275.00	122.50	135.00	60.00	100.00	•108.25	107.00	115.00	100.00	100.00	105.00	105.00	82.80	73.60
Aver.	*105.83*	*231.70*	*327.21*	*277.50*	*142.12*	*193.21*	*79.53*	*74.22*	*114.85*	*102.85*	*114.79*	*95.02*	*94.50*	*103.17*	*105.00*	*93.70*	*79.47*

•Price at furnace, where lower than price at seaboard.

Spiegeleisen (19 *to* 21 *Per Cent*), *Gross Ton, at Furnace*

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$25.00	$30.38	$60.00	$60.00	$66.00	$51.40	$45.00	$26.00	$34.40	$38.00	$33.00	$32.00	$37.00	$30.80	$31.00	$31.00	$28.00
Feb.	25.00	36.25	68.75	61.25	60.75	58.75	40.00	38.00	35.50	38.00	33.00	32.00	37.00	31.00	31.00	31.00	28.00
March	25.00	57.00	75.00	71.25	47.00	60.00	35.00	29.40	40.00	38.00	33.00	32.00	37.00	31.00	31.00	31.00	28.00
April	25.00	65.00	75.00	80.75	45.00	67.60	34.00	32.25	45.00	36.80	33.00	32.00	37.00	31.00	31.00	31.00	28.00
May	25.00	65.00	81.00	84.00	37.40	75.00	32.00	35.00	52.50	36.00	33.00	32.00	36.25	31.00	31.00	31.00	28.00
June	25.00	61.00	82.50	89.00	31.25	75.00	32.00	36.00	48.50	35.00	32.80	32.00	35.50	31.00	31.00	31.00	28.00
July	25.00	52.50	85.00	89.00	35.00	75.00	27.00	36.00	44.00	34.20	32.00	32.00	33.50	31.00	31.00	31.00	28.00
Aug.	25.00	45.00	85.00	89.00	35.00	80.00	26.00	37.80	46.75	32.50	32.00	32.00	33.00	32.50	31.00	31.00	28.00
Sept.	26.60	45.00	82.50	83.75	35.00	82.00	26.00	38.25	43.75	31.40	31.80	32.00	33.00	33.00	31.00	31.00	28.00
Oct.	29.25	42.75	76.25	82.00	35.00	81.88	26.00	38.00	43.75	30.75	31.25	32.00	30.75	33.00	31.00	31.00	28.00
Nov.	29.25	45.40	66.00	80.25	37.00	75.62	26.00	37.50	41.25	30.25	32.00	37.40	30.00	30.00	31.00	30.50	28.00
Dec.	29.25	55.00	60.00	74.38	40.00	59.10	26.00	37.50	39.00	32.00	32.00	36.50	30.00	31.00	31.00	28.40	26.20
Aver.	*26.20*	*50.02*	*74.75*	*78.72*	*42.03*	*70.11*	*31.25*	*34.31*	*42.87*	*34.41*	*32.40*	*32.83*	*34.17*	*31.36*	*31.00*	*30.74*	*27.85*

50 Per Cent Ferrosilicon (Gross Ton, Delivered East of Mississippi River)

	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$80.00	$75.00	$54.00	$82.50	$75.00	$82.50	$85.00	$85.00	$83.50	$83.50	$83.50	$83.50
Feb.	85.00	93.00	55.00	83.75	75.00	82.50	85.00	85.00	83.50	83.50	83.50	83.50
March	85.00	92.40	55.00	90.00	75.00	82.50	85.00	85.00	83.50	83.50	83.50	83.50
April	85.00	86.25	55.00	92.50	75.00	82.50	85.00	85.00	83.50	83.50	83.50	83.50
May	80.00	76.40	55.00	94.50	75.00	82.50	85.00	85.00	83.50	83.50	83.50	83.50
June	80.00	69.75	55.00	90.00	75.00	82.50	85.00	85.00	83.50	83.50	83.50	83.50
July	80.00	66.00	55.00	82.50	71.00	82.50	85.00	85.00	83.50	83.50	83.50	83.50
Aug.	75.00	60.80	55.00	82.50	71.25	82.50	85.00	85.00	83.50	83.50	83.50	83.50
Sept.	75.00	60.00	55.00	82.50	72.00	82.50	85.00	85.00	83.50	83.50	83.50	83.50
Oct.	75.00	58.50	67.00	81.00	71.00	82.50	85.00	85.00	83.50	83.50	83.50	83.50
Nov.	75.00	55.80	75.00	80.63	70.00	82.50	85.00	85.00	83.50	83.50	83.50	83.50
Dec.	75.00	56.00	82.50	76.25	75.00	82.50	85.00	83.50	83.50	83.50	83.50	78.70
Aver.	*79.17*	*70.83*	*59.88*	*84.89*	*73.35*	*82.50*	*85.00*	*84.88*	*83.50*	*83.50*	*83.50*	*83.10*

Connellsville Coke Prices for Twenty Years

Prompt Connellsville Furnace Coke, Net Ton at Oven

	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$1.82	$3.88	$1.85	$1.50	$2.94	$9.50	$6.00	$5.65	$6.00	$5.06	$2.75	$8.05	$3.94	$3.94	$7.19	$3.50	$2.70	$2.75	$2.55	$2.50
Feb.	1.78	2.52	1.85	1.50	3.38	9.62	6.00	4.44	6.00	4.50	3.04	7.13	4.08	3.63	7.31	3.38	2.68	2.90	2.60	2.50
March	2.12	2.40	1.90	1.50	3.47	9.60	6.00	4.06	6.00	4.35	3.25	7.25	4.08	3.35	3.05	3.35	2.60	2.98	2.60	2.50
April	2.39	2.15	1.86	1.50	2.41	7.38	6.00	3.65	9.60	3.50	4.48	6.31	3.75	3.04	3.00	3.20	2.60	2.78	2.60	2.50
May	2.28	2.13	1.77	1.50	2.30	7.80	6.00	3.69	12.00	3.25	6.00	5.15	3.25	3.00	2.91	2.94	2.60	2.75	2.53	2.45
June	2.02	2.11	1.75	1.56	2.49	11.25	6.00	4.00	15.00	3.00	6.75	4.75	3.19	2.77	2.83	2.93	2.60	2.75	2.50	2.40
July	2.21	2.45	1.75	1.64	2.75	12.75	6.00	4.07	17.20	2.81	10.75	4.55	3.00	2.83	2.84	3.00	2.63	2.75	2.50	2.40
Aug.	2.21	2.50	1.70	1.50	2.80	13.60	6.00	4.31	17.75	2.75	12.80	4.56	3.00	3.06	2.95	3.00	2.75	2.73	2.58	2.40
Sept.	2.37	2.29	1.65	1.61	2.94	11.12	6.00	4.56	16.70	3.15	11.13	4.50	3.00	3.49	3.38	2.85	2.75	2.65	2.60	2.40
Oct.	3.41	2.98	1.60	2.03	4.88	6.00	6.00	4.52	15.12	3.28	9.60	3.85	3.00	6.13	3.63	2.85	2.83	2.65	2.60	2.40
Nov.	3.94	1.82	1.52	2.28	6.90	6.00	6.00	5.87	8.26	3.03	7.19	3.81	3.04	5.75	4.43	2.77	2.75	2.65	2.53	2.40
Dec.	4.00	1.75	1.50	2.64	8.38	6.00	6.00	6.12	6.20	2.75	7.00	4.00	3.68	4.32	3.50	2.75	2.75	2.63	2.50	2.34
Aver.	*2.55*	*2.42*	*1.73*	*1.73*	*3.80*	*9.22*	*6.00*	*4.58*	*11.32*	*3.45*	*7.01*	*5.33*	*3.42*	*3.78*	*3.92*	*3.04*	*2.69*	*2.75*	*2.56*	*2.43*

Prompt Connellsville Foundry Coke, Net Ton at Oven

	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$1.97	$4.40	$2.50	$2.00	$3.50	$9.75	$7.00	$6.25	$7.00	$6.38	$3.75	$8.70	$4.75	$4.88	$7.75	$4.50	$3.75	$3.75	$3.50	$3.50
Feb.	2.09	3.25	2.50	2.00	3.50	11.00	7.00	5.00	7.00	5.63	4.00	8.25	4.88	4.31	8.31	4.31	3.75	3.75	3.50	3.50
March	2.56	3.00	2.45	2.00	3.75	11.60	7.00	4.94	7.00	5.45	4.25	8.38	4.88	4.15	4.40	4.40	3.75	3.75	3.50	3.50
April	2.69	3.00	2.40	2.00	3.56	9.13	7.00	4.30	10.20	4.75	5.06	7.56	4.75	4.00	4.06	4.06	3.75	3.75	3.50	3.50
May	2.58	2.85	2.40	2.00	3.25	8.90	7.00	4.31	13.00	4.50	6.30	6.15	4.69	4.00	4.00	4.00	3.75	3.75	3.50	3.50
June	2.40	2.80	2.32	2.00	3.25	11.72	7.00	4.56	15.75	4.45	7.25	5.56	4.38	4.80	4.00	4.00	3.75	3.75	3.50	3.50
July	2.40	2.70	2.22	2.05	3.25	13.25	7.00	5.00	17.80	4.06	11.00	5.35	4.10	3.75	4.00	4.00	3.75	3.75	3.50	3.50
Aug.	2.40	2.90	2.25	2.00	3.30	13.20	7.00	5.25	18.88	3.75	13.90	5.38	4.00	3.88	4.00	4.00	3.75	3.75	3.50	3.50
Sept.	2.54	2.90	2.10	2.07	3.31	11.75	7.00	5.80	17.70	4.15	12.50	5.50	4.00	4.25	4.38	4.00	3.75	3.75	3.50	3.50
Oct.	3.65	2.81	2.00	2.35	3.88	6.00	7.00	6.25	16.38	4.38	11.70	4.80	4.00	6.31	4.63	4.00	3.75	3.75	3.50	3.50
Nov.	4.25	2.60	1.92	2.88	7.10	7.00	7.00	7.00	9.50	4.19	8.38	4.81	4.06	6.81	5.50	3.85	3.75	3.75	3.50	3.50
Dec.	4.50	2.50	1.90	2.95	8.63	7.00	7.00	7.00	7.00	3.81	7.88	4.81	4.55	5.20	4.50	3.75	3.75	3.75	3.50	3.25
Aver.	*2.84*	*2.98*	*2.25*	*2.19*	*4.19*	*10.03*	*7.00*	*5.47*	*12.27*	*4.63*	*8.00*	*6.27*	*4.42*	*4.61*	*4.96*	*4.11*	*3.75*	*3.75*	*3.50*	*3.48*

No. 1 Heavy Melting Steel Scrap Composite Price

(Average of Pittsburgh, Chicago and Philadelphia Quotations, Gross Ton)

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$10.27	$16.46	$21.73	$29.93	$17.77	$25.13	$14.04	$12.45	$20.22	$19.15	$20.08	$16.97	$15.17	$13.70	$17.02	$14.65	$11.30
Feb.	10.39	16.10	21.35	29.92	14.75	26.00	15.21	12.46	21.46	19.21	18.27	15.50	14.58	13.71	16.96	14.92	11.15
March	10.78	17.28	23.60	29.58	14.52	25.50	13.17	13.46	24.79	17.56	16.92	15.83	14.65	13.65	16.71	14.88	11.10
April	10.61	17.42	26.63	28.47	15.79	24.42	11.63	14.71	24.00	15.20	15.48	15.27	14.71	13.81	17.18	14.30	10.83
May	10.79	16.47	27.63	28.79	15.06	23.71	12.20	15.67	20.77	14.71	15.46	14.35	13.95	13.90	16.54	13.71	9.94
June	10.78	15.25	37.21	28.87	16.54	23.47	11.47	15.52	18.94	14.88	16.09	14.40	13.60	13.52	16.39	13.31	9.39
July	11.65	15.19	36.00	29.00	19.13	24.21	11.00	15.92	17.23	16.00	16.46	15.42	13.48	13.13	16.60	13.08	9.25
Aug.	13.00	15.35	31.30	29.00	20.25	25.88	11.57	16.30	16.58	16.58	17.23	15.88	13.80	13.75	16.86	13.29	9.25
Sept.	13.79	15.67	31.50	29.00	18.87	26.53	12.15	18.33	16.98	17.20	17.39	16.25	13.92	14.75	16.60	13.70	9.12
Oct.	13.62	16.90	26.60	29.00	18.67	23.73	12.88	19.20	15.15	17.08	17.08	15.58	13.48	15.85	15.85	12.77	8.78
Nov.	14.63	20.40	27.83	28.50	20.50	20.00	12.73	18.02	15.13	18.17	17.63	15.25	13.18	15.73	14.83	11.69	8.74
Dec.	16.20	24.13	28.87	25.00	22.77	15.92	12.29	17.94	17.37	20.08	17.39	15.08	13.48	15.97	14.13	11.28	8.61
Aver.	*12.21*	*17.22*	*28.35*	*28.76*	*17.89*	*23.71*	*12.61*	*15.83*	*19.05*	*17.15*	*17.12*	*15.48*	*14.00*	*14.29*	*16.28*	*13.45*	*9.79*

Scrap Prices at Pittsburgh, Gross Ton

No. 1 Heavy Melting Steel

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$11.63	$17.50	$22.60	$30.00	$19.00	$26.30	$15.50	$14.30	$21.80	$21.38	$21.50	$18.63	$16.88	$15.10	$19.31	$16.69	$13.19
Feb.	11.63	17.06	21.75	30.00	14.75	27.75	16.00	14.00	23.25	20.88	19.50	17.50	16.13	14.94	18.63	16.81	12.88
March	12.00	18.45	23.25	30.00	14.00	27.25	14.00	15.13	25.38	19.38	18.50	17.55	16.55	14.81	18.44	16.56	12.80
April	11.81	17.81	28.00	28.50	15.20	26.00	12.63	16.38	25.88	16.20	17.00	16.63	16.50	15.31	18.60	15.95	12.39
May	11.75	16.95	28.80	28.50	14.75	25.00	13.30	17.30	22.80	15.63	16.75	15.69	15.40	15.25	17.88	15.25	11.25
June	11.75	15.88	41.00	28.62	17.12	25.00	12.69	17.00	21.13	16.00	17.30	15.75	14.81	14.56	18.25	15.13	10.30
July	12.31	16.31	39.00	29.00	19.70	26.00	12.00	17.38	18.10	17.50	18.00	16.81	15.00	14.10	18.55	14.75	10.56
Aug.	13.81	16.05	32.83	29.00	21.00	28.13	12.70	17.75	17.75	17.50	18.88	17.50	15.40	15.50	19.00	15.13	10.69
Sept.	14.30	16.19	33.25	29.00	19.20	29.00	13.63	20.13	17.88	18.10	18.70	17.88	15.50	16.56	18.31	15.60	10.65
Oct.	14.38	18.25	28.80	29.00	19.00	27.75	14.13	21.40	15.70	18.50	18.50	17.25	14.75	17.60	17.30	14.56	10.22
Nov.	15.88	21.20	29.50	28.87	22.25	23.50	14.30	20.50	16.13	19.63	19.50	17.20	14.25	17.19	16.39	13.19	10.22
Dec.	17.45	26.00	30.00	26.87	24.25	17.20	14.25	20.13	18.75	21.40	19.10	16.75	14.88	17.90	15.45	12.75	10.25
Aver.	*13.23*	*18.14*	*29.90*	*28.95*	*18.35*	*25.74*	*13.76*	*17.62*	*20.38*	*18.51*	*18.60*	*17.10*	*15.50*	*15.74*	*18.01*	*15.20*	*11.28*

Machine Shop Turnings

	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$15.75	$17.50	$14.30	$12.00	$10.80	$11.50	$11.50	$6.00
Feb.	16.13	15.88	13.63	11.38	10.88	11.50	11.39	6.44
March	14.50	14.20	13.35	12.00	10.25	10.63	10.94	7.65
April	12.45	13.39	12.00	12.63	10.44	11.15	10.90	7.06
May	11.88	12.25	11.00	11.30	10.20	11.06	10.19	6.57
June	13.00	13.05	11.00	10.50	9.00	11.63	9.56	6.50
July	13.50	13.63	11.38	11.50	9.10	11.90	8.60	6.75
Aug.	14.13	15.00	12.80	11.80	9.88	13.00	8.00	7.00
Sept.	14.40	14.75	13.06	11.63	11.13	12.06	8.00	7.30
Oct.	14.25	14.39	12.06	11.50	11.10	11.75	6.88	7.00
Nov.	15.94	15.00	11.90	11.10	11.00	11.00	6.00	6.94
Dec.	17.20	14.30	11.56	11.00	11.10	10.25	6.00	6.70
Aver.	*14.43*	*14.44*	*12.34*	*11.53*	*10.41*	*11.45*	*8.98*	*6.83*

Compressed Sheets

	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$18.88	$20.00	$17.63	$15.50	$14.15	$18.81	$16.39	$12.50
Feb.	19.63	18.00	16.13	15.06	14.06	18.31	16.19	12.56
March	17.50	17.35	15.60	15.45	14.56	18.25	15.75	12.55
April	14.60	15.63	15.25	15.56	14.94	18.55	15.60	11.94
May	13.75	15.46	14.75	14.40	14.90	17.81	15.06	10.88
June	14.38	16.30	14.60	13.75	14.25	18.13	14.81	9.75
July	15.70	16.63	15.50	14.31	13.60	18.25	14.65	10.06
Aug.	16.00	17.39	16.40	14.45	14.75	18.44	14.94	10.13
Sept.	16.55	17.40	16.50	14.50	16.39	18.19	14.95	10.35
Oct.	16.50	17.39	15.63	14.50	17.15	17.15	14.19	9.63
Nov.	17.75	18.00	16.00	13.70	17.00	16.13	12.81	9.75
Dec.	19.40	18.00	15.56	13.94	17.80	15.15	12.00	9.80
Aver.	*16.72*	*17.27*	*15.80*	*14.59*	*15.30*	*17.77*	*14.78*	*10.86*

Low-Phosphorus Scrap (Billet and Bloom Crops)

	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$25.30	$23.60	$26.50	$24.00	$21.00	$18.50	$22.00	$20.88	$17.25
Feb.	27.50	25.13	24.75	22.25	20.25	18.50	22.00	21.25	18.00
March	32.00	24.00	23.30	22.00	20.30	18.50	22.50	21.50	18.00
April	32.25	19.40	22.13	21.13	21.00	18.50	23.45	21.40	17.50
May	28.60	19.50	21.63	20.00	20.00	18.60	22.50	19.88	15.00
June	25.88	20.13	22.00	20.00	19.25	19.00	22.25	19.13	14.10
July	22.00	20.90	22.00	20.75	19.00	19.00	22.45	19.20	14.50
Aug.	23.50	21.88	22.25	21.00	19.00	19.13	23.00	19.38	14.50
Sept.	24.38	22.60	23.00	21.67	20.00	19.88	22.39	20.00	14.30
Oct.	21.90	23.00	23.13	20.50	19.25	20.20	21.75	18.75	13.50
Nov.	20.50	23.25	24.00	20.60	18.30	20.50	21.13	17.13	13.00
Dec.	21.75	25.13	24.00	21.13	18.50	21.00	20.75	17.00	13.00
Aver.	*25.46*	*22.39*	*23.22*	*21.25*	*19.65*	*19.28*	*22.18*	*19.63*	*15.22*

Cast Iron Borings

	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$16.94	$17.50	$14.88	$12.50	$11.30	$12.88	$11.25	$7.50
Feb.	16.88	15.88	14.13	12.13	11.00	12.50	11.56	7.50
March	15.38	14.10	13.30	12.50	10.50	12.25	11.00	7.70
April	13.00	13.39	12.50	12.38	11.00	12.45	10.55	7.50
May	12.75	12.50	11.75	11.10	10.90	12.00	10.39	7.63
June	14.00	13.05	11.90	10.50	10.39	12.25	9.88	6.75
July	13.80	13.63	12.38	10.63	10.00	12.40	8.90	7.25
Aug.	14.75	15.00	12.75	11.00	10.75	12.75	8.50	7.56
Sept.	14.90	14.75	12.94	11.00	12.13	12.25	8.65	7.20
Oct.	15.00	14.39	12.50	11.00	12.50	12.25	8.00	7.25
Nov.	15.13	15.00	12.90	11.00	12.13	11.63	7.75	6.94
Dec.	16.70	14.90	12.13	11.13	12.00	10.75	7.40	6.70
Aver.	*14.94*	*14.51*	*12.84*	*11.57*	*11.22*	*12.20*	*9.49*	*7.29*

No. 1 Cast Cupola Scrap

	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$30.00	$24.20	$32.00	$25.00	$16.30	$23.30	$21.00	$19.63	$17.50	$16.00	$14.50	$16.00	$14.00	$12.00
Feb.	30.00	18.75	34.00	22.75	16.00	24.75	21.38	20.13	17.00	15.56	14.50	15.00	14.00	12.00
March	30.00	18.00	34.00	21.20	15.94	26.75	20.25	18.60	17.00	15.80	14.50	15.13	14.00	12.00
April	29.00	19.00	33.00	18.00	16.88	27.75	18.50	17.75	16.50	16.00	14.50	15.39	14.00	12.00
May	28.50	17.20	32.00	18.00	18.50	26.30	17.88	17.50	16.50	15.70	14.50	15.50	14.00	10.75
June	28.62	18.50	32.00	16.63	18.75	24.13	17.25	17.10	15.90	15.13	14.25	15.50	14.00	10.00
July	29.00	20.40	40.20	16.00	19.00	21.10	17.80	17.00	15.75	15.00	14.25	15.50	13.00	10.00
Aug.	29.00	23.50	41.25	16.20	19.00	21.38	18.00	17.50	16.80	15.00	14.50	15.50	13.00	10.50
Sept.	29.00	23.50	42.00	16.88	22.13	21.75	18.00	17.40	16.50	15.00	14.94	15.50	13.00	10.10
Oct.	29.00	23.80	39.75	17.50	24.00	19.50	18.00	17.39	16.00	14.75	15.40	15.50	12.88	9.50
Nov.	29.00	27.25	34.25	17.10	23.13	18.63	18.13	18.00	16.30	14.35	15.00	15.13	12.13	9.50
Dec.	27.00	28.75	27.25	16.13	22.38	20.00	19.10	17.70	16.00	14.38	14.80	14.50	12.00	9.50
Aver.	*29.01*	*21.90*	*35.14*	*18.45*	*19.33*	*22.95*	*18.77*	*17.98*	*16.48*	*15.22*	*14.64*	*15.34*	*13.33*	*10.65*

No. 1 Railroad Cast Scrap at Cincinnati

(Net Ton)

	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$17.20	$17.25	$17.38	$15.75	$14.00	$12.00	$13.73	$13.39	$10.80
Feb.	19.50	17.75	15.88	15.00	13.00	12.00	13.67	13.39	10.80
March	21.75	16.25	15.50	14.50	13.00	11.60	13.62	13.39	10.80
April	22.00	14.00	15.13	14.10	13.00	11.60	13.62	13.39	10.50
May	20.60	13.00	15.00	13.50	13.00	11.43	13.62	13.28	10.35
June	18.00	13.38	15.90	13.63	13.00	11.39	13.62	12.95	10.35
July	16.70	14.50	16.00	14.50	13.00	11.39	13.62	12.95	10.35
Aug.	16.25	14.50	15.63	14.75	13.00	11.39	13.62	12.95	10.35
Sept.	16.88	15.30	15.50	15.00	13.00	11.60	13.62	11.52	8.80
Oct.	14.50	14.88	15.00	14.39	12.50	12.60	13.57	11.15	7.98
Nov.	13.66	15.63	15.88	14.00	12.25	13.17	13.39	11.15	7.81
Dec.	15.00	16.38	16.00	14.00	12.00	13.35	13.39	10.80	7.81
Aver.	*17.67*	*15.23*	*15.73*	*14.42*	*12.90*	*11.96*	*13.59*	*12.53*	*9.73*

No. 1 Machinery Cast Scrap at Cincinnati

(Net Ton)

	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$20.39	$20.50	$20.12	$19.75	$17.00	$14.30	$17.14	$16.52	$12.60
Feb.	21.75	21.50	19.12	19.39	16.00	14.30	17.24	16.52	12.60
March	23.65	20.00	18.35	19.00	16.00	13.85	17.19	16.52	12.60
April	24.75	18.00	17.75	17.80	16.00	13.85	17.19	16.52	11.90
May	24.05	16.75	17.75	17.00	15.60	13.65	17.19	15.85	11.25
June	22.13	17.13	18.15	17.00	15.50	13.60	17.19	15.63	11.25
July	20.25	18.25	18.25	17.00	15.50	13.55	17.19	15.63	11.25
Aug.	19.05	18.25	19.00	17.63	15.50	13.40	17.05	15.63	11.25
Sept.	19.38	18.13	19.25	18.00	15.50	14.20	16.96	13.48	9.45
Oct.	18.00	17.68	19.00	17.39	15.50	15.65	16.92	12.95	9.04
Nov.	16.85	18.40	20.12	17.00	14.50	16.70	16.57	12.95	8.93
Dec.	18.00	18.75	20.00	17.00	14.00	16.50	16.52	12.59	8.93
Aver.	*20.69*	*18.69*	*18.91*	*17.83*	*15.55*	*14.47*	*17.03*	*15.07*	*10.92*

Scrap Prices at Chicago, Gross Ton

No. 1 Heavy Melting Steel

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$9.19	$15.50	$21.12	$30.00	$17.40	$24.50	$15.13	$11.45	$19.15	$17.69	$19.44	$15.12	$13.25	$12.50	$15.39	$12.75	$10.27
Feb.	9.56	14.75	21.50	30.25	15.06	25.00	15.13	11.38	20.33	17.88	17.69	13.88	13.00	12.69	15.88	13.31	10.06
March	9.63	16.50	23.70	29.87	15.63	24.25	12.50	12.38	23.50	16.56	16.45	13.95	12.90	12.63	15.66	13.19	10.00
April	9.15	16.50	27.00	28.75	16.41	23.75	11.00	13.75	22.50	14.10	14.81	13.19	13.13	12.63	15.95	13.00	9.81
May	9.37	15.94	28.70	28.80	15.62	23.00	11.50	14.95	19.70	13.75	15.00	12.13	12.35	12.95	15.39	12.50	8.88
June	9.44	14.80	36.50	29.00	16.69	22.95	10.81	14.56	17.88	13.63	15.75	12.45	12.00	12.63	14.94	12.06	8.75
July	10.40	14.50	33.00	29.00	19.40	24.13	10.00	15.25	17.05	14.90	15.60	14.19	12.06	12.30	14.75	12.00	8.75
Aug.	11.56	15.25	29.60	29.00	20.88	25.35	10.60	15.95	16.00	15.50	16.44	14.00	12.30	12.75	15.06	12.13	8.38
Sept.	11.75	16.06	31.25	29.00	19.10	24.81	11.31	18.13	16.31	16.40	16.35	14.00	12.25	12.94	15.13	12.50	8.20
Oct.	11.75	16.81	26.00	29.00	18.25	21.50	12.44	18.40	14.15	16.13	16.00	13.00	11.69	13.95	14.30	11.38	8.00
Nov.	13.44	20.60	27.60	28.50	20.88	18.45	12.25	17.31	14.00	17.13	16.00	13.00	11.50	14.50	13.15	10.13	8.00
Dec.	15.63	23.00	28.37	22.75	21.80	16.20	11.13	17.25	16.06	18.95	15.75	13.00	12.06	14.55	12.50	10.00	7.80
Aver.	*10.91*	*16.68*	*27.86*	*28.66*	*18.09*	*22.82*	*11.98*	*15.06*	*18.05*	*16.05*	*16.27*	*13.49*	*12.39*	*13.09*	*14.84*	*12.08*	*8.91*

Old Steel Rerolling Rails

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$9.62	$17.06	$27.00	$35.00	$22.10	$34.25	$15.63	$12.10	$20.40	$18.88	$21.75	$17.50	$16.38	$14.90	$17.00	$14.63	$12.50
Feb.	9.87	17.06	27.00	35.00	16.44	34.38	15.50	12.00	21.75	20.13	19.25	16.63	15.94	15.00	17.50	15.00	12.00
March	10.25	17.65	28.00	34.75	16.38	32.30	13.30	13.31	24.63	19.13	17.86	16.50	15.60	14.44	17.50	15.00	12.00
April	10.25	18.00	32.62	33.50	17.55	32.13	12.63	14.50	23.75	16.30	16.00	16.13	16.00	13.81	17.50	15.00	11.75
May	10.25	17.38	36.50	34.00	17.75	31.75	13.40	15.70	21.70	15.00	16.88	15.19	15.20	14.40	17.50	14.81	10.69
June	10.25	15.85	46.90	34.00	18.75	32.65	12.94	15.25	19.25	14.81	17.85	15.45	14.75	14.81	17.50	14.63	8.40
July	10.30	15.25	45.19	34.00	25.15	35.00	12.25	16.13	18.00	15.50	17.44	17.19	14.88	14.75	17.50	14.50	10.39
Aug.	12.25	15.80	39.20	34.00	29.50	38.00	12.45	16.90	17.50	16.19	19.00	17.10	15.30	15.13	17.75	14.50	10.13
Sept.	13.35	17.06	39.75	34.00	26.80	38.13	13.13	19.38	17.38	17.30	19.25	17.39	15.19	15.88	17.81	14.40	10.00
Oct.	13.31	18.81	34.75	34.00	27.19	33.44	14.00	20.30	15.80	17.06	18.88	16.63	14.88	16.50	17.20	13.88	10.00
Nov.	14.44	24.50	34.30	33.50	31.25	22.90	13.80	18.38	15.06	18.19	19.44	16.50	14.50	16.63	15.50	12.50	10.25
Dec.	16.63	28.63	35.25	27.50	31.90	16.90	12.63	17.75	17.00	20.36	19.10	16.19	14.63	16.60	14.60	12.50	10.50
Aver.	*11.73*	*18.59*	*35.58*	*33.60*	*23.40*	*31.90*	*13.47*	*15.98*	*19.35*	*17.40*	*18.56*	*16.53*	*15.27*	*15.24*	*17.07*	*14.28*	*10.72*

Cast Iron Borings

	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$10.08	$18.48	$12.54	$16.11	$10.92	$6.38	$15.57	$13.58	$15.56	$13.39	$10.06	$10.40	$12.50	$9.56	$5.06
Feb.	10.15	18.48	8.75	16.39	11.76	6.93	16.59	15.55	14.63	12.06	10.13	10.13	12.00	10.13	4.75
March	10.64	18.48	10.15	15.74	8.40	8.05	18.91	14.38	13.85	11.75	10.20	9.63	10.63	9.56	4.75
April	11.83	17.99	10.47	15.96	7.28	9.24	17.92	11.40	10.94	10.94	10.44	9.31	10.40	9.25	4.50
May	13.44	17.53	9.31	14.43	6.61	10.98	16.24	10.00	10.00	9.75	10.00	9.25	10.19	8.81	3.75
June	19.60	17.77	9.33	13.38	5.60	11.63	14.43	10.06	10.70	9.95	9.56	9.00	9.88	8.00	3.75
July	20.01	18.48	12.71	14.15	5.32	12.67	13.66	10.45	11.13	11.19	9.94	9.05	9.75	7.90	3.75
Aug.	18.36	18.48	14.28	15.06	5.38	12.88	12.04	10.69	12.75	11.45	10.50	9.31	10.19	7.75	3.94
Sept.	18.20	18.48	13.55	14.65	5.60	14.43	12.19	11.80	13.15	11.19	10.75	9.75	10.50	7.35	4.10
Oct.	15.75	18.48	11.63	12.88	6.44	14.90	10.42	11.56	12.75	8.88	10.13	10.75	10.00	5.75	4.00
Nov.	17.25	16.80	12.88	11.93	6.83	14.56	10.08	12.63	13.19	9.20	9.60	11.69	9.25	4.13	4.00
Dec.	18.05	14.84	14.17	10.98	6.09	14.56	12.04	14.36	13.50	9.50	10.19	11.85	9.15	4.90	3.60
Aver.	*15.28*	*17.94*	*11.65*	*14.30*	*7.19*	*11.43*	*14.17*	*12.21*	*12.68*	*10.77*	*10.13*	*10.01*	*10.37*	*7.76*	*4.16*

Steel Knuckles and Couplers

	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$25.20	$37.52	$24.51	$27.44	$16.39	$12.77	$24.98	$21.21	$22.88	$18.00	$16.25	$14.65	$16.50	$16.00	$12.00
Feb.	25.20	36.89	19.32	29.68	16.11	12.39	26.53	21.77	21.00	17.13	16.00	14.50	17.00	16.00	12.00
March	26.60	35.00	19.60	27.66	13.55	14.12	28.71	20.00	18.70	16.70	15.60	14.06	17.00	15.88	11.80
April	30.67	34.00	19.21	26.32	12.47	15.68	27.93	17.40	17.63	16.44	15.69	13.81	17.30	15.25	10.56
May	33.71	34.00	17.36	25.48	13.66	16.69	25.42	17.00	17.63	15.39	14.80	14.50	17.13	14.31	9.75
June	43.83	34.00	18.20	25.20	13.16	15.89	22.55	16.63	19.00	15.30	14.25	14.25	16.75	13.75	9.75
July	45.92	34.00	20.50	27.16	11.63	17.92	21.00	17.20	18.19	17.39	14.25	13.75	16.75	13.50	9.75
Aug.	44.24	34.00	23.52	29.01	12.21	19.21	20.87	18.00	19.50	17.50	14.40	14.00	16.94	13.50	9.32
Sept.	40.88	34.00	21.95	27.72	13.03	21.84	21.56	19.35	19.50	17.39	14.00	14.75	17.00	13.50	9.00
Oct.	33.38	34.00	21.43	24.51	14.84	22.96	18.93	18.25	18.63	16.06	13.25	15.75	17.00	13.00	8.70
Nov.	33.04	34.00	23.39	20.83	14.28	21.84	17.64	19.63	18.75	15.50	13.00	16.00	16.39	12.13	8.50
Dec.	35.67	32.55	24.86	16.95	12.60	22.12	19.88	22.78	18.25	15.50	13.69	16.00	16.00	12.00	8.45
Aver.	*34.86*	*34.50*	*21.15*	*25.67*	*13.66*	*17.79*	*23.00*	*19.10*	*19.14*	*16.53*	*14.60*	*14.67*	*16.81*	*14.07*	*9.97*

Railroad Malleable Scrap

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$9.11	$15.47	$19.88	$30.02	$19.71	$32.48	$16.52	$12.77	$25.26	$20.93	$21.13	$18.00	$16.06	$13.60	$18.69	$16.39	$12.75
Feb.	8.96	14.93	19.39	30.02	16.65	33.53	17.36	12.81	26.75	21.77	20.00	17.56	16.06	13.50	19.39	17.13	11.94
March	8.89	15.62	20.10	31.24	18.07	31.92	15.46	13.87	28.56	21.00	19.10	17.60	16.00	12.63	19.39	16.88	11.70
April	8.96	15.56	22.81	31.64	17.70	30.95	13.59	15.68	28.00	19.30	17.50	17.39	15.88	12.75	19.35	16.55	11.13
May	9.12	15.05	26.10	32.82	17.08	29.68	14.11	16.80	25.54	18.13	17.63	16.50	14.45	13.00	18.56	15.75	10.25
June	9.11	13.14	35.41	33.04	17.92	28.73	12.88	16.73	24.08	16.88	18.00	16.60	13.50	12.69	17.81	13.94	9.55
July	9.97	13.03	33.73	33.28	20.94	30.24	12.53	17.51	22.51	17.00	17.88	17.81	13.63	12.50	16.85	13.50	9.00
Aug.	11.20	12.60	33.26	34.01	22.96	32.20	13.44	19.04	20.59	17.38	19.13	17.75	14.50	12.88	16.94	13.50	8.43
Sept.	11.48	12.88	34.44	34.01	21.22	30.95	14.63	23.67	21.71	18.20	19.10	17.39	13.69	14.39	17.00	13.50	7.50
Oct.	11.48	13.87	28.28	34.01	21.35	26.32	15.12	24.42	19.60	18.13	18.50	16.50	13.13	15.30	17.00	13.13	7.40
Nov.	12.75	17.92	28.67	32.68	25.89	21.78	14.67	23.11	18.91	19.00	19.19	16.50	12.55	15.88	16.39	12.69	7.25
Dec.	15.40	20.16	30.63	25.48	28.78	16.80	12.81	22.40	20.23	20.28	18.30	16.00	12.81	17.00	16.10	12.25	7.00
Aver.	*10.53*	*15.02*	*27.72*	*31.85*	*20.85*	*28.80*	*14.43*	*18.23*	*23.48*	*19.00*	*18.79*	*17.13*	*14.36*	*13.85*	*17.79*	*14.66*	*9.49*

Old Cast Iron Carwheels

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$9.94	$14.63	$18.87	$30.00	$25.90	$36.13	$21.00	$15.30	$26.70	$20.50	$21.38	$18.00	$15.31	$13.90	$14.13	$13.81	$11.00
Feb.	10.00	13.94	18.25	30.00	22.75	38.06	20.63	15.00	27.25	21.00	19.38	17.13	15.13	14.00	14.50	14.69	10.50
March	9.94	14.30	20.25	30.00	21.50	36.20	15.90	16.50	28.38	21.00	17.10	17.00	15.00	13.88	14.50	14.69	10.10
April	9.75	13.88	23.62	29.00	21.50	37.50	14.06	18.63	27.75	16.70	16.00	16.39	15.00	13.50	14.50	14.45	9.50
May	9.75	12.95	27.35	29.00	21.25	37.50	14.70	18.50	24.10	16.25	16.06	15.25	14.05	13.45	14.50	13.88	9.13
June	10.19	12.44	39.00	29.00	22.00	35.90	13.31	18.25	21.88	15.63	17.30	15.30	13.50	13.06	14.39	13.55	10.00
July	11.30	12.50	35.25	29.00	23.95	35.75	12.75	19.25	20.60	16.40	17.12	16.39	13.75	12.80	14.00	13.50	10.00
Aug.	11.04	11.60	30.40	29.00	26.25	38.35	12.95	20.60	19.50	17.13	17.50	15.90	14.50	12.75	14.00	13.50	9.75
Sept.	11.80	11.69	31.87	29.00	24.90	37.69	14.19	23.75	19.75	18.20	17.70	15.25	14.25	13.31	14.00	13.50	9.50
Oct.	12.00	12.94	25.75	29.00	24.88	36.06	16.50	25.10	17.90	17.63	17.38	14.50	13.56	13.85	14.00	13.13	9.30
Nov.	13.31	17.30	28.15	29.00	28.63	31.95	16.60	24.63	17.88	18.63	18.31	14.50	13.25	14.25	13.88	12.13	8.75
Dec.	14.56	21.25	31.00	26.75	31.10	24.40	15.75	24.00	19.75	20.70	18.30	14.50	13.44	14.10	13.60	11.75	8.50
Aver.	*11.13*	*14.12*	*27.48*	*29.06*	*24.55*	*35.46*	*15.70*	*19.96*	*22.62*	*18.31*	*17.79*	*15.84*	*14.23*	*13.57*	*14.17*	*13.55*	*9.67*

No. 1 Railroad Wrought, at Chicago, Net Ton

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan. ...	$8.69	$15.88	$23.50	$31.25	$19.10	$26.00	$13.63	$10.50	$17.75	$15.31	$17.44	$13.50	$12.50	$11.10	$13.63	$12.00	$8.50
Feb. ...	8.87	14.94	23.75	31.25	15.13	27.00	13.50	10.44	18.38	15.38	16.13	12.88	12.31	11.13	14.25	12.19	8.00
March ..	9.00	16.20	25.90	30.75	15.88	27.10	11.60	11.50	20.88	14.06	14.60	12.95	12.10	11.00	14.00	12.25	8.10
April ...	8.65	17.00	30.35	30.20	16.05	27.25	10.00	12.13	20.00	12.75	13.00	12.44	12.39	11.25	14.15	11.95	8.19
May ...	8.94	16.50	32.60	29.75	15.69	26.38	10.40	12.90	17.60	12.00	13.44	10.94	11.35	11.60	14.13	11.13	7.50
June ...	9.00	15.20	41.00	29.75	16.87	25.25	9.63	12.69	15.50	11.56	14.65	11.60	11.00	11.31	13.63	10.25	7.20
July ...	9.15	14.94	37.75	29.75	18.60	24.88	9.25	13.63	14.60	12.80	14.19	13.31	11.39	10.85	13.50	9.90	7.00
Aug. ...	10.44	15.30	33.70	29.75	20.75	24.75	10.45	14.75	14.25	13.75	16.00	13.50	11.70	11.06	13.88	9.75	7.00
Sept. ..	11.00	16.38	35.50	29.75	19.50	23.88	11.50	17.62	15.63	14.80	15.50	13.50	11.25	11.81	14.00	9.75	6.95
Oct. ...	11.19	17.50	28.75	30.36	19.38	20.25	13.00	17.75	13.20	14.25	14.38	12.81	10.19	12.60	13.70	9.19	6.75
Nov. ...	12.94	21.00	30.90	28.68	22.88	16.85	12.20	15.81	12.50	15.50	15.63	12.50	9.60	13.13	12.44	8.63	6.50
Dec. ...	15.38	25.13	31.25	24.62	24.10	14.60	10.44	15.13	15.00	16.81	13.95	12.00	10.44	13.25	12.00	8.50	6.50
Aver...	*10.27*	*17.16*	*31.25*	*29.66*	*18.66*	*23.68*	*11.30*	*13.74*	*16.27*	*14.08*	*14.91*	*12.66*	*11.35*	*11.67*	*13.30*	*10.46*	*7.35*

No. 1 Machinery Cast Scrap, at Chicago, Net Ton

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan. ...	$9.19	$13.31	$15.50	$25.90	$22.95	$37.25	$17.25	$12.90	$21.60	$20.38	$19.88	$17.00	$16.50	$14.50	$15.81	$13.50	$9.50
Feb. ...	9.00	12.81	15.37	26.06	20.00	38.88	18.00	13.25	23.63	21.00	18.75	17.00	16.50	14.50	16.25	13.75	9.50
March ..	9.00	13.45	16.90	27.25	21.63	37.85	14.90	14.13	26.25	20.13	18.20	17.00	16.50	14.50	16.00	13.75	9.50
April ...	9.00	12.88	20.43	27.12	21.45	37.25	13.25	14.88	25.75	18.40	17.25	16.39	16.50	14.13	16.00	13.50	9.39
May ...	9.00	12.56	23.20	26.70	20.12	37.38	13.60	16.20	23.30	17.38	16.88	15.88	15.80	14.00	15.39	12.88	9.00
June ...	9.00	11.75	30.00	27.12	20.75	36.30	12.75	16.06	21.75	16.75	17.50	16.15	14.50	13.88	14.75	12.50	9.00
July ...	9.25	11.50	29.25	28.06	23.30	36.50	12.25	17.00	19.60	16.90	17.50	17.19	14.50	13.50	14.50	12.00	9.00
Aug. ...	9.62	11.50	24.20	29.10	24.50	36.20	12.60	18.60	18.00	17.50	17.63	17.00	14.80	13.94	14.50	12.00	9.00
Sept. ...	10.10	12.13	23.75	30.00	24.20	34.00	13.44	21.38	19.63	18.20	17.90	16.88	14.56	14.81	14.50	11.40	8.50
Oct.	10.50	13.50	20.50	30.36	25.00	28.75	13.88	20.80	18.70	17.50	17.63	16.50	14.25	15.40	14.50	10.63	8.50
Nov. ...	12.13	15.55	22.00	28.87	28.12	23.00	13.50	20.25	18.38	17.88	18.19	16.00	13.50	15.50	13.63	9.36	8.50
Dec. ...	13.75	16.25	23.50	25.75	32.35	18.70	12.63	19.75	19.75	19.20	17.25	16.13	14.00	15.60	13.50	9.50	8.50
Aver...	*9.96*	*13.10*	*22.05*	*27.69*	*23.70*	*33.51*	*14.00*	*17.10*	*21.36*	*18.44*	*17.88*	*16.59*	*15.16*	*14.39*	*15.11*	*11.75*	*8.95*

Philadelphia Scrap Prices, Delivered Eastern Pennsylvania, Gross Ton

No. 1 Heavy Melting Steel

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan. ...	$10.00	$16.38	$21.70	$30.00	$17.20	$24.75	$14.50	$11.60	$19.70	$18.20	$18.50	$17.00	$15.39	$13.50	$16.39	$14.50	$10.50
Feb. ...	10.00	16.50	20.63	30.00	14.75	25.62	14.25	12.00	20.75	18.38	17.63	15.88	14.63	13.50	16.39	14.63	10.50
March ..	10.80	16.90	23.50	29.00	14.19	25.20	13.00	12.78	25.25	16.75	15.90	16.00	14.50	13.50	16.13	14.88	10.50
April ...	11.00	17.88	24.88	28.00	15.50	24.12	11.25	14.00	23.63	15.30	14.63	16.00	14.50	13.50	17.00	13.95	10.31
May ...	11.25	16.60	25.40	29.00	15.00	23.37	11.80	14.75	19.80	14.75	14.63	15.25	14.10	13.50	16.39	13.39	9.69
June ...	11.10	15.31	34.13	29.00	16.12	22.60	11.25	15.00	17.88	15.00	15.10	14.70	14.00	13.39	16.00	12.75	9.10
July ...	12.06	14.94	35.20	29.00	18.90	22.62	11.00	15.00	16.60	15.40	15.63	14.63	13.39	13.00	16.50	12.50	8.44
Aug. ...	13.75	14.75	31.88	29.00	19.37	25.00	11.40	15.20	16.00	16.75	16.38	16.20	13.70	13.00	16.50	12.63	8.69
Sept. ...	15.00	14.75	30.25	29.00	18.62	25.62	11.50	16.88	16.75	17.10	17.20	16.88	14.00	14.75	16.39	13.00	8.50
Oct. ...	14.75	15.63	25.00	29.00	19.10	22.75	12.06	17.80	15.40	16.63	16.75	16.50	14.00	16.00	15.70	12.38	8.13
Nov. ...	14.65	20.13	26.00	28.00	20.62	19.00	11.88	16.25	15.25	17.75	17.38	15.50	13.80	15.50	15.00	11.75	8.00
Dec. ...	15.81	23.75	28.20	25.00	22.50	15.25	11.50	16.38	16.75	20.10	17.50	15.50	13.50	15.40	14.50	11.10	7.75
Aver...	*12.51*	*16.96*	*27.23*	*28.67*	*17.66*	*22.99*	*12.12*	*14.80*	*18.65*	*16.84*	*16.44*	*15.84*	*14.13*	*14.05*	*16.07*	*13.12*	*9.18*

No. 1 Machinery Cast

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan. ...	$12.00	$17.00	$20.20	$30.00	$23.80	$36.00	$23.25	$16.50	$23.20	$20.70	$20.13	$18.39	$17.00	$16.00	$16.31	$15.00	$12.00
Feb. ...	12.00	17.00	20.00	30.00	23.00	40.00	23.00	16.50	24.25	20.25	18.88	17.75	17.00	16.00	16.50	15.00	11.90
March ..	12.00	17.00	21.75	30.00	21.25	39.20	19.40	17.13	28.25	18.63	18.00	17.50	17.00	16.00	16.25	15.00	11.50
April ..	11.75	17.88	26.63	29.00	22.00	38.00	18.00	17.25	26.25	17.70	17.25	17.50	17.00	16.00	16.50	14.85	11.50
May ...	12.13	17.50	29.00	29.00	21.50	37.75	18.00	18.40	24.30	17.00	17.00	17.25	16.80	16.00	16.50	14.00	11.50
June ...	12.25	16.50	33.50	29.00	22.00	37.00	17.38	19.00	22.25	17.50	17.50	17.00	16.00	16.00	16.50	13.50	11.20
July ...	12.38	16.00	36.30	29.00	22.10	37.50	16.50	17.50	20.40	17.50	17.63	17.00	16.00	15.50	16.50	13.00	11.00
Aug. ...	13.30	16.00	33.25	29.00	24.75	39.00	17.00	18.60	20.38	17.88	18.00	17.70	16.00	15.50	16.50	13.00	11.00
Sept. ...	14.00	16.00	31.00	29.00	25.00	39.25	17.00	21.50	21.38	18.00	18.00	18.00	16.38	16.25	16.88	13.00	11.00
Oct.	14.00	16.15	28.00	29.00	25.20	38.75	17.13	22.60	19.50	17.50	18.00	17.39	16.50	17.10	16.00	13.00	11.00
Nov. ...	14.50	18.50	30.00	29.00	27.62	33.80	17.50	21.00	19.25	17.88	18.00	17.30	16.13	16.39	15.88	12.00	11.00
Dec. ...	16.06	20.75	30.60	29.00	30.75	24.50	16.63	20.25	20.25	19.50	18.13	17.00	16.00	16.25	15.00	12.00	10.10
Aver...	*13.03*	*17.19*	*28.35*	*29.25*	*24.08*	*36.73*	*18.49*	*18.85*	*22.47*	*18.34*	*18.04*	*17.48*	*16.48*	*16.08*	*16.28*	*13.61*	*11.23*

No. 1 Railroad Wrought

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan. ...	$12.00	$22.00	$26.60	$35.00	$24.20	$33.50	$20.00	$14.50	$22.10	$20.90	$20.88	$18.39	$17.00	$15.25	$15.50	$15.00	$13.13
Feb. ...	12.00	21.63	25.50	35.00	21.50	36.00	19.75	14.63	24.75	21.50	20.13	17.75	17.00	15.06	16.00	15.00	12.00
March ..	12.50	22.13	30.75	35.00	20.25	35.90	17.20	15.38	27.50	19.00	18.90	17.20	17.00	14.60	16.00	15.00	12.00
April ..	12.69	23.38	36.00	35.00	21.60	35.00	17.00	15.88	27.00	18.10	17.75	17.50	16.50	14.50	16.00	15.00	11.25
May ...	12.94	22.50	41.40	34.00	21.00	33.50	15.20	16.90	24.20	16.63	17.50	17.25	16.50	14.50	16.00	15.00	11.00
June ...	13.00	20.50	51.25	34.00	21.50	33.00	14.38	17.00	22.50	16.50	18.10	16.60	16.00	13.75	16.00	15.00	10.20
July ...	13.44	19.50	50.60	34.00	24.40	33.00	13.50	17.13	18.80	17.70	17.63	16.50	15.75	13.50	16.00	15.00	10.00
Aug. ...	14.95	20.20	45.00	34.00	26.50	33.00	14.00	18.00	18.00	18.63	17.50	17.80	15.50	13.50	16.00	15.00	10.00
Sept. ...	16.50	20.00	44.00	34.00	26.50	33.25	15.00	20.88	18.50	19.00	17.70	17.88	15.50	14.50	16.00	15.00	10.00
Oct.	16.13	21.63	37.20	34.00	26.90	29.25	15.88	22.20	17.50	18.00	18.13	17.00	15.50	15.60	16.00	14.75	10.00
Nov. ...	16.50	24.13	35.00	34.00	28.37	25.00	16.00	19.00	17.38	18.38	18.50	17.00	15.30	16.00	15.88	13.75	10.00
Dec. ...	20.06	26.75	35.00	33.00	30.25	20.00	14.63	19.25	18.50	20.40	18.50	17.00	15.25	16.00	15.40	13.50	9.50
Aver...	*14.39*	*22.03*	*38.19*	*34.25*	*24.41*	*31.70*	*16.04*	*17.56*	*21.39*	*18.73*	*18.44*	*17.32*	*16.07*	*14.73*	*15.90*	*14.75*	*10.75*

Old Cast Iron Carwheels

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan. ...	$11.00	$16.38	$21.50	$30.00	$24.60	$36.00	$25.00	$16.50	$22.30	$20.10	$19.50	$18.13	$16.38	$15.50	$16.50	$15.00	$13.75
Feb. ...	10.63	16.50	20.50	30.00	23.00	40.62	24.00	15.00	24.75	20.38	18.38	17.50	16.00	15.50	16.50	15.00	13.50
March ..	11.00	16.70	21.50	30.00	23.00	42.40	18.50	15.94	26.50	18.75	18.50	17.50	16.00	15.50	16.50	15.00	13.40
April ...	11.00	17.38	25.75	29.00	23.10	40.00	18.00	15.88	26.50	17.50	17.75	17.50	16.00	15.50	16.50	15.00	12.63
May ...	11.38	16.70	28.00	29.00	21.00	40.00	16.80	16.70	24.20	17.00	17.00	17.25	16.00	15.50	16.39	14.88	12.25
June ...	11.55	16.38	34.00	29.00	22.00	38.00	18.00	17.13	22.75	17.00	17.00	17.00	15.38	15.50	16.00	14.50	12.00
July ...	12.38	15.63	36.20	29.00	23.20	38.50	16.50	17.50	20.40	17.30	17.25	17.00	15.00	15.50	16.39	14.50	12.00
Aug. ...	13.25	15.50	34.50	29.00	24.50	40.60	16.40	18.10	20.25	17.75	18.50	17.40	15.30	15.50	16.50	14.63	12.00
Sept. ...	14.00	15.50	32.50	29.00	24.50	42.75	17.00	21.75	21.00	18.00	18.50	17.50	15.50	15.88	16.50	15.00	12.00
Oct.	13.75	15.88	29.00	29.00	24.50	40.50	17.00	22.50	19.60	17.50	18.50	17.13	15.50	16.50	16.50	15.00	12.00
Nov. ...	14.05	18.88	31.25	29.00	27.75	36.40	17.20	20.50	17.75	17.88	18.50	16.60	15.50	16.50	15.75	14.38	12.00
Dec. ...	15.63	22.38	32.40	28.00	30.50	26.00	16.63	20.00	19.50	19.20	18.50	16.50	15.50	16.50	15.50	14.00	11.50
Aver...	*12.47*	*16.98*	*28.93*	*29.17*	*24.30*	*38.48*	*18.42*	*18.13*	*22.18*	*18.20*	*18.16*	*17.22*	*15.67*	*15.78*	*16.29*	*14.74*	*12.42*

Metals, Tin Plate and Galvanized Sheets for Seventeen Years

Copper at New York, Cents a Pound (Lake Copper through 1919; Electrolytic Copper, 1920 to Date)

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	14.02	24.39	29.73	23.50	20.48	19.27	12.95	13.55	14.52	12.46	14.73	13.84	12.99	13.85	16.59	17.75	9.79
Feb.	15.21	26.85	34.90	23.50	17.86	19.02	12.84	12.92	15.34	12.73	14.49	14.00	12.69	13.82	17.74	17.75	9.71
March	15.75	27.10	35.85	23.50	15.46	18.50	12.19	12.68	16.84	13.52	14.06	13.86	13.08	13.90	21.25	17.75	9.88
April	18.90	28.27	31.67	23.50	15.55	19.19	12.49	12.61	16.81	13.21	13.30	13.69	12.81	14.13	19.69	15.67	9.48
May	21.00	28.88	31.42	23.50	16.18	19.05	12.79	13.13	15.54	12.76	13.34	13.60	12.65	14.19	17.75	12.76	8.67
June	23.38	27.82	32.46	23.50	17.95	19.00	12.88	13.62	14.74	12.35	13.41	13.64	12.37	14.50	17.75	12.09	8.05
July	21.98	25.84	28.78	25.80	22.07	19.00	12.46	13.71	14.39	12.39	13.95	13.91	12.51	14.50	17.75	11.02	7.67
Aug.	19.33	26.95	27.24	26.00	23.16	19.00	11.70	13.74	13.87	13.26	14.48	14.19	13.00	14.50	17.75	10.65	7.26
Sept.	17.97	28.03	24.90	26.00	22.68	18.70	12.01	13.75	13.36	12.97	14.42	14.05	12.93	14.70	17.75	10.39	6.98
Oct.	17.89	28.48	23.50	26.00	22.13	16.56	12.67	13.66	12.58	12.96	14.29	13.88	12.98	15.16	17.75	9.60	6.75
Nov.	18.92	32.32	23.50	26.00	20.69	14.63	13.07	13.62	12.76	13.59	14.36	13.59	13.34	15.75	17.75	10.17	6.54
Dec.	20.24	33.38	23.50	25.40	18.90	13.63	13.55	14.00	12.88	14.23	13.82	13.31	13.79	15.84	17.75	10.29	6.60
Aver.	*18.72*	*28.19*	*28.95*	*24.68*	*19.43*	*17.96*	*12.63*	*13.42*	*14.47*	*13.04*	*14.05*	*13.80*	*12.93*	*14.57*	*18.11*	*12.99*	*8.11*

Spelter (Zinc) at New York, Cents a Pound

	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	7.15	5.29	6.59	18.19	9.94	7.88	7.38	9.62	5.83	5.06	7.28	6.78	7.10	8.75	7.03	6.00	6.70	5.59	4.37
Feb.	6.45	5.40	8.84	20.13	10.48	7.99	6.70	9.14	5.36	4.85	7.58	7.11	7.86	8.16	7.04	5.90	6.70	4.53	4.36
March	6.26	5.28	9.29	18.40	10.77	7.64	6.52	8.93	5.20	5.00	8.19	6.85	7.68	7.69	7.06	5.98	6.80	5.30	4.30
April	5.77	5.18	11.22	18.58	9.85	7.01	6.51	8.63	5.24	5.25	7.65	6.49	7.35	7.36	6.69	6.11	7.04	5.19	4.06
May	5.47	5.06	16.14	15.86	9.46	7.32	6.46	8.08	5.28	5.45	6.99	6.13	7.30	7.16	6.43	6.37	6.98	4.98	3.66
June	5.18	5.09	22.18	12.75	9.62	8.01	6.93	7.92	4.95	5.69	6.40	6.14	7.35	7.47	6.57	6.50	7.00	4.79	3.75
July	5.38	5.02	20.58	9.83	8.95	8.69	7.90	8.18	4.77	6.12	6.43	6.25	7.60	7.76	6.58	6.55	7.10	4.66	4.25
Aug.	5.75	5.60	14.11	8.98	8.69	8.96	7.84	8.31	4.69	6.59	6.68	6.53	7.55	7.69	6.70	6.59	7.15	4.72	4.17
Sept.	5.82	5.50	14.16	8.22	8.34	9.60	7.57	7.82	4.74	6.91	6.81	6.54	8.12	7.76	6.56	6.60	7.15	4.62	4.09
Oct.	5.42	4.97	13.96	9.98	8.24	9.11	7.83	7.51	5.10	7.20	6.66	6.67	8.65	7.66	6.35	6.60	7.09	4.40	3.73
Nov.	5.29	5.12	17.15	11.90	7.95	8.70	8.14	6.84	5.18	7.48	6.70	7.14	9.04	7.56	6.09	6.62	6.63	4.63	3.55
Dec.	5.18	5.71	16.69	11.13	7.84	8.45	8.59	6.00	5.25	7.46	6.60	7.73	8.97	7.39	6.15	6.70	6.09	4.43	3.50
Aver.	*5.76*	*5.27*	*14.24*	*13.66*	*9.18*	*8.28*	*7.36*	*8.08*	*5.13*	*6.09*	*7.00*	*6.70*	*7.96*	*7.70*	*6.60*	*6.39*	*6.87*	*4.82*	*3.98*

Lead, at New York, Cents a Pound

	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	4.35	4.11	3.74	5.93	7.69	6.87	5.56	8.67	5.00	4.70	7.85	8.31	10.26	9.25	7.59	6.50	6.65	6.25	4.80
Feb.	4.35	4.06	3.82	6.23	9.13	7.04	5.05	8.88	4.54	4.70	8.14	9.01	9.38	9.08	7.40	6.34	6.85	6.24	4.55
March	4.35	3.97	4.04	7.43	9.47	7.24	5.23	9.21	4.08	4.71	8.47	9.23	8.90	8.46	7.57	6.00	7.41	5.66	4.53
April	4.40	3.82	4.20	7.73	9.43	6.95	5.03	8.95	4.33	5.13	8.19	8.19	8.01	7.91	7.10	6.10	7.19	5.58	4.42
May	4.37	3.90	4.25	7.45	11.00	6.88	5.05	8.55	4.99	5.51	7.39	7.27	8.08	7.75	6.60	6.13	7.00	5.51	3.82
June	4.35	3.90	5.89	6.87	11.68	7.55	5.34	8.48	4.56	5.73	7.14	7.08	8.35	8.08	6.42	6.30	7.00	5.41	3.92
July	4.37	3.90	5.59	6.34	10.72	8.04	5.65	8.67	4.40	5.75	6.28	7.15	8.33	8.60	6.33	6.22	6.80	5.25	4.40
Aug.	4.64	3.87	4.68	6.26	10.72	8.05	5.77	8.98	4.40	5.88	6.74	8.02	9.52	8.96	6.69	6.25	6.75	5.49	4.40
Sept.	4.73	3.86	4.62	6.88	8.84	8.05	6.12	8.11	4.60	6.20	7.06	8.09	9.60	8.80	6.30	6.45	6.88	5.50	4.40
Oct.	4.52	3.52	4.60	7.00	6.77	8.05	6.45	7.24	4.70	6.67	6.84	8.31	9.62	8.40	6.25	6.50	6.87	5.17	3.97
Nov.	4.33	3.68	5.16	7.13	6.44	8.05	6.76	6.33	4.70	7.20	6.87	8.96	9.84	8.00	6.27	6.39	6.29	5.10	3.94
Dec.	4.06	3.80	5.33	7.60	6.48	6.71	7.03	4.80	4.70	7.28	7.61	9.61	9.36	7.87	6.52	6.49	6.25	5.10	3.80
Aver.	*4.40*	*3.87*	*4.66*	*6.90*	*9.03*	*7.46*	*5.76*	*8.07*	*4.58*	*5.79*	*7.39*	*8.27*	*9.10*	*8.39*	*6.75*	*6.31*	*6.83*	*5.52*	*4.25*

Straits Tin, at New York, Cents a Pound

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	34.13	41.76	44.10	85.13	71.50	62.74	35.94	32.03	39.16	48.70	58.26	62.20	66.43	55.56	49.21	38.84	26.03
Feb.	37.25	42.60	51.47	85.00	72.45	59.87	32.16	30.74	41.98	53.41	57.09	63.65	69.05	52.47	49.39	38.63	26.27
March	48.73	50.53	58.38	85.00	72.50	61.93	28.79	29.14	48.61	55.03	53.67	64.47	69.23	52.11	48.85	36.76	27.02
April	47.64	51.51	55.82	88.53	72.50	62.12	30.36	30.58	45.84	50.02	52.27	63.35	67.88	52.28	45.93	35.90	25.13
May	38.79	49.14	63.21	100.00	72.50	54.99	32.50	30.92	43.11	44.08	54.65	62.36	67.47	51.53	43.88	32.16	23.16
June	40.26	42.07	61.93	91.00	71.83	48.34	29.39	31.46	40.97	42.74	55.93	60.63	67.42	47.92	44.20	30.26	23.53
July	37.38	38.25	61.61	93.00	70.11	49.29	27.69	31.67	38.47	46.29	58.05	62.98	64.01	47.01	46.29	29.76	24.96
Aug.	34.37	38.88	62.53	91.33	62.20	47.60	26.35	32.36	39.33	41.89	58.12	65.17	64.41	47.97	46.60	30.00	25.73
Sept.	33.13	38.65	61.54	80.40	59.79	44.43	26.70	32.36	41.60	49.24	58.27	68.89	61.43	48.06	45.32	29.59	24.51
Oct.	33.05	41.10	62.24	78.82	54.82	40.47	27.70	34.61	41.80	50.60	62.24	70.36	58.49	48.99	42.25	26.76	22.72
Nov.	39.50	44.12	74.18	73.67	54.17	36.97	28.93	36.76	44.09	54.25	63.30	70.75	57.49	50.76	40.18	25.87	22.78
Dec.	38.53	42.55	84.74	71.51	53.80	34.04	32.41	37.48	47.16	56.03	62.94	68.68	58.54	50.23	39.87	25.01	21.28
Aver.	*38.56*	*43.43*	*61.90*	*85.28*	*65.68*	*50.23*	*29.91*	*32.51*	*42.68*	*50.19*	*57.90*	*64.29*	*64.32*	*50.39*	*45.16*	*31.63*	*24.43*

Tin Plate, at Pittsburgh, Dollars a Base Box

	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	$3.60	$3.32	$3.10	$3.75	$7.00	$7.75	$7.35	$7.00	$7.00	$4.75	$4.75	$5.50	$5.50	$5.50	$5.50	$5.25	$5.35	$5.25	$5.00
Feb.	3.60	3.29	3.10	3.96	7.38	7.75	7.35	7.00	7.00	4.71	4.80	5.50	5.50	5.50	5.50	5.25	5.35	5.25	5.00
March	3.60	3.30	3.25	4.19	8.00	7.75	7.26	7.00	7.00	4.60	5.23	5.50	5.50	5.50	5.50	5.25	5.35	5.25	5.00
April	3.60	3.30	3.25	4.50	8.00	7.75	7.00	7.00	6.44	4.75	6.00	5.50	5.50	5.50	5.50	5.25	5.35	5.25	5.00
May	3.60	3.30	3.15	5.30	8.40	7.75	7.00	7.00	6.25	4.75	5.70	5.50	5.50	5.50	5.50	5.25	5.35	5.25	5.00
June	3.60	3.30	3.11	5.81	10.50	7.75	7.00	7.00	6.25	4.75	5.50	5.50	5.50	5.50	5.50	5.25	5.35	5.25	5.00
July	3.60	3.27	3.10	6.00	12.00	7.75	7.00	7.50	5.69	4.75	5.50	5.50	5.50	5.50	5.50	5.25	5.35	5.25	5.00
Aug.	3.55	3.41	3.10	5.95	11.40	7.75	7.00	9.00	5.25	4.75	5.50	5.50	5.50	5.50	5.50	5.25	5.35	5.25	5.00
Sept.	3.50	3.35	3.15	5.75	12.00	7.75	7.00	9.00	5.25	4.75	5.50	5.50	5.50	5.50	5.50	5.25	5.35	5.25	5.00
Oct.	3.50	3.24	3.15	5.81	...	7.75	7.00	8.33	5.13	4.75	5.50	5.50	5.50	5.50	5.50	5.25	5.35	5.00	4.75
Nov.	3.40	3.15	3.28	5.97	7.75	7.75	7.00	7.50	4.75	4.75	5.50	5.50	5.50	5.50	5.50	5.25	5.35	5.00	4.75
Dec.	3.40	3.13	3.52	6.63	7.75	7.55	7.00	7.00	4.73	4.75	5.50	5.50	5.50	5.50	5.25	5.25	5.35	5.00	4.75
Aver.	*3.55*	*3.28*	*3.19*	*5.30*	*9.11*	*7.73*	*7.08*	*7.53*	*5.90*	*4.73*	*5.42*	*5.50*	*5.50*	*5.50*	*5.48*	*5.25*	*5.35*	*5.19*	*4.94*

No. 28 Gage Galvanized Sheets, at Pittsburgh, Cents a Pound

(While No. 24 gage was made the base in 1926, this table is continued at No. 28 gage, to preserve comparisons with past years)

	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	3.46	2.87	2.79	4.75	6.25	6.25	6.05	5.33	5.70	4.00	4.35	4.98	4.75	4.60	4.28	4.15	4.10	3.83	3.40
Feb.	3.50	2.95	3.16	4.75	6.38	6.25	6.05	6.50	5.56	4.00	4.54	5.00	4.75	4.53	4.21	4.15	4.10	3.80	3.40
March	3.50	2.95	3.40	4.75	6.69	6.25	5.96	7.00	5.05	4.00	4.93	4.93	4.62	4.50	4.15	4.15	4.10	3.80	3.40
April	3.50	2.91	3.29	5.00	7.00	6.25	5.70	7.00	4.88	4.11	5.25	4.88	4.45	4.50	4.13	4.15	4.10	3.80	3.34
May	3.42	2.80	3.50	4.94	8.20	6.25	5.70	7.00	5.00	4.15	5.20	4.80	4.29	4.43	4.22	4.08	4.10	3.73	3.30
June	3.38	2.75	4.28	4.69	9.50	6.25	5.70	7.00	4.88	4.15	5.00	4.76	4.21	4.28	4.35	4.00	4.10	3.69	3.24
July	3.33	2.75	4.40	4.38	10.00	6.25	5.70	8.25	4.31	4.15	5.00	4.56	4.19	4.24	4.35	3.96	4.10	3.63	3.40
Aug.	3.24	2.85	3.71	4.21	10.00	6.25	5.70	9.00	3.90	4.23	5.00	5.55	4.20	4.23	4.35	3.90	4.00	3.55	3.40
Sept.	3.16	2.95	3.56	4.18	9.75	6.25	5.70	8.88	3.81	4.35	5.00	4.60	4.20	4.33	4.35	3.90	4.00	3.50	3.40
Oct.	3.08	2.95	3.50	4.41	...	6.25	5.70	8.18	4.00	4.50	5.00	4.60	4.23	4.35	4.26	4.00	4.00	3.49	3.40
Nov.	2.98	2.88	3.89	5.18	6.25	6.25	5.70	7.04	3.86	4.43	4.93	4.60	4.50	4.35	4.16	4.00	3.98	3.45	3.40
Dec.	2.90	2.78	4.75	6.00	6.25	6.15	5.70	5.70	4.00	4.35	4.89	4.72	4.60	4.35	4.13	4.08	3.90	3.42	3.36
Aver.	*3.29*	*2.87*	*3.69*	*4.77*	*7.84*	*6.24*	*5.78*	*7.24*	*4.58*	*4.20*	*4.92*	*4.75*	*4.42*	*4.39*	*4.25*	*4.04*	*4.05*	*3.64*	*3.37*

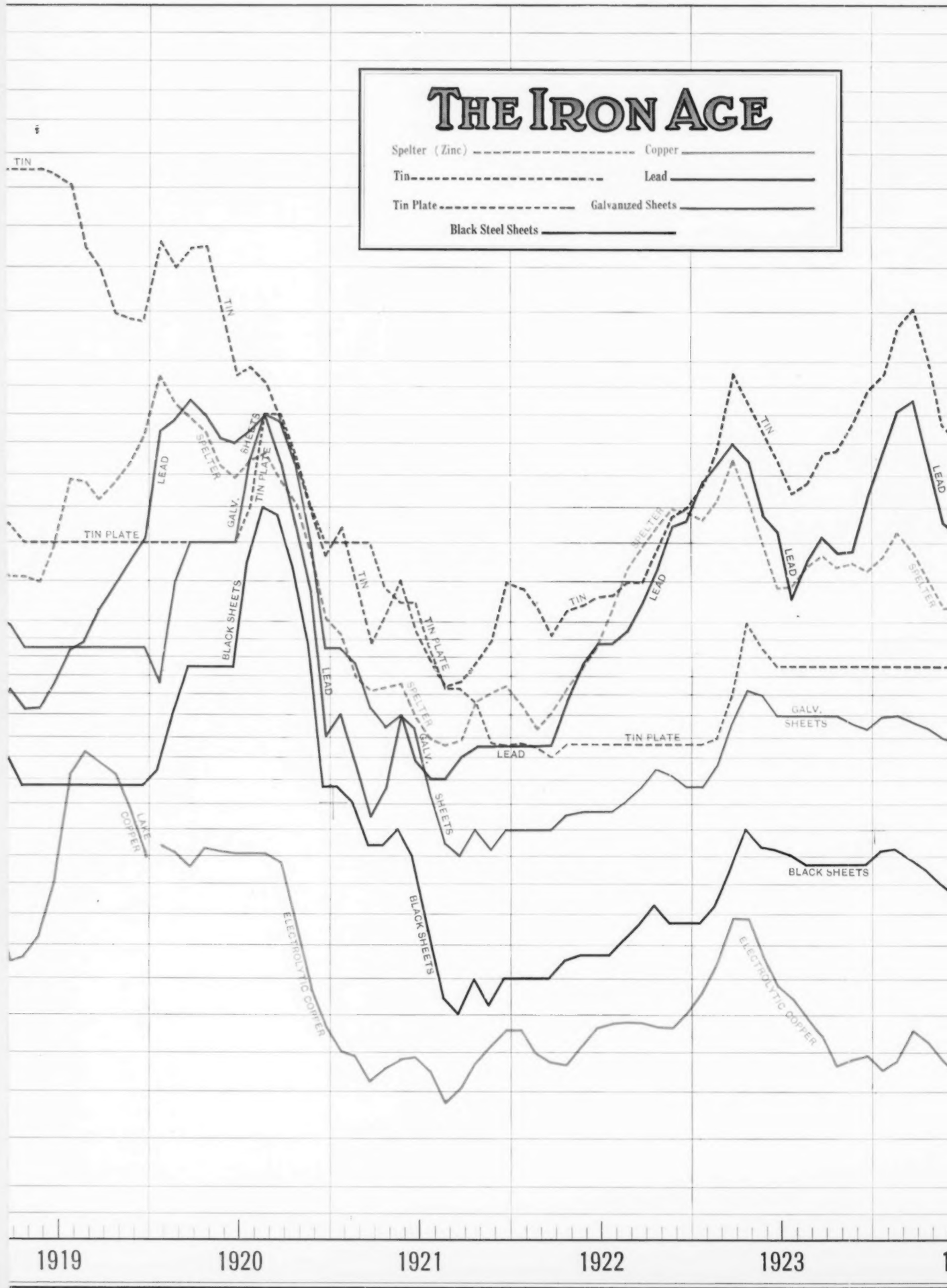
CENTS A POUND—SHEETS, LEAD AND SPELTER
DOLLARS A BASE BOX—TIN PLATE

20
18
16
14
12
10
9
8
7
6
5
4
3
2
1.8

1915
1916
1917
1918
1919

SPELTER
TIN
TIN PLATE
LEAD
BLACK SHEETS
GALV.
GALVANIZED SHEETS
LAKE COPPER

Carload P



Carload Prices of Copper, Lead, Tin and Zinc in New York, and of Tin Plate

TIN

TIN

TIN

TIN

LEAD

LEAD

LEAD

LEAD

SPELTER

SPELTER

SPELTER

SPELTER

TIN PLATE

TIN PLATE

TIN PLATE

GALV. SHEETS

GALV. SHEETS

ELECTROLYTIC COPPER

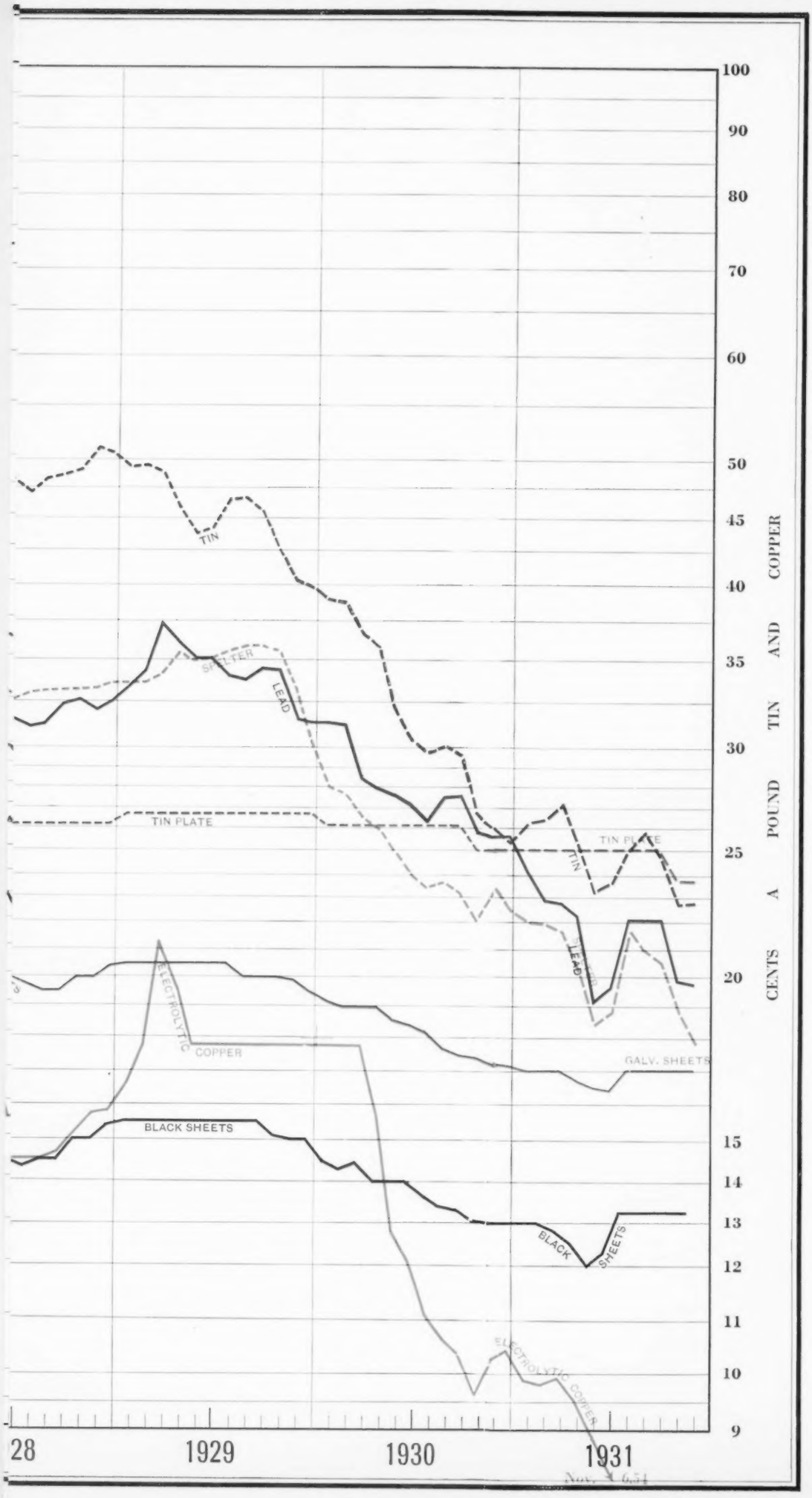
BLACK SHEETS

BLACK SHEETS

ELECTROLYTIC COPPER

1924 1925 1926 1927 1928 1929 1930

Tin Plate and Black and Galvanized Sheets in Pittsburgh


100
90
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15
14
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12
11
10
9
CENTS A POUND TIN AND COPPER
TIN
SPELTER
LEAD
TIN PLATE
TIN PLATE
TIN
LEAD
ELECTROLYTIC COPPER
GALV. SHEETS
BLACK SHEETS
BLACK SHEETS
ELECTROLYTIC COPPER
28
1929
1930
1931

Production of Iron and Steel and of Commodities Made from Them

Steel Ingots Made in the United States

(THE IRON AGE *figures prior to June, 1917; American Iron and Steel Institute figures since then*)

(*Thousands of Gross Tons*)

	Jan-uary	Feb-ruary	March	April	May	June	Half Year	July	August	Septem-ber	Octo-ber	Novem-ber	Decem-ber	Second Half	Year
1899.....	801	718	822	796	874	862	4,873	856	932	917	950	980	951	*5,586	*10,459
1900.....	979	868	962	893	977	921	*5,600	798	775	685	712	698	727	4,395	9,995
1901.....	*1,009	968	*1,069	*1,085	*1,162	1,094	*6,388	1,136	1,159	1,079	*1,200	1,176	1,018	*6,768	*13,156
1902.....	*1,223	1,060	1,192	*1,256	*1,321	1,185	*7,237	1,189	1,211	1,209	1,268	1,174	1,268	*7,319	*14,556
1903.....	1,217	1,131	1,265	*1,322	*1,363	*1,376	*7,674	1,230	1,250	1,277	1,178	822	674	6,431	14,105
1904.....	759	1,020	1,239	1,325	1,263	1,100	6,706	885	1,001	1,153	1,196	1,262	1,327	6,824	13,530
1905.....	*1,516	1,389	*1,710	1,624	*1,735	1,576	*9,550	1,425	1,629	1,670	*1,746	*1,770	1,673	*9,913	*19,463
1906.....	*1,928	1,746	*2,018	1,848	1,956	1,833	*11,329	1,739	1,794	1,757	*2,047	2,029	1,929	11,295	*22,624
1907.....	2,005	1,830	1,949	2,007	*2,087	1,944	*11,822	1,975	2,046	1,899	*2,124	1,654	1,039	10,737	22,559
1908.....	934	954	1,057	1,023	1,004	972	5,944	1,049	1,171	1,263	1,401	1,350	1,499	7,733	13,677
1909.....	1,623	1,575	1,722	1,622	1,700	1,801	10,043	1,899	2,030	*2,225	*2,347	*2,376	*2,379	13,256	*23,299
1910.....	*2,404	2,257	*2,506	2,365	2,203	2,157	*13,892	1,904	2,016	1,956	1,929	1,818	1,639	11,262	*25,154
1911.....	1,716	1,788	2,199	2,001	1,918	1,801	11,423	1,682	1,951	1,992	2,050	2,015	1,916	11,606	23,029
1912.....	2,169	2,191	2,441	2,491	*2,648	2,461	*14,401	2,445	2,648	2,484	*2,833	2,759	2,715	*15,884	*30,285
1913.....	2,814	2,562	2,679	2,757	*2,841	2,532	*16,185	2,482	2,466	2,510	2,563	2,151	1,923	14,095	30,280
1914.....	1,907	1,881	2,287	2,285	2,039	1,930	12,329	1,907	1,944	1,895	1,799	1,470	1,476	10.491	22,820
1915.....	1,663	1,777	2,226	2,271	2,351	2,555	12,843	2,662	*2,887	*3,061	*3,246	*3,259	*3,326	*18,441	*31,284
1916.....	*3,333	3,321	*3,627	3,356	*3,652	3,473	*20,762	3,245	3,481	3,463	*3,672	3,581	3,198	20,640	*41,402
1917.....	*3,743	3,093	*3,864	3,792	*4,061	3,617	*22,170	3,447	3,663	3,486	3,932	3,714	3,207	21,449	*43,619
1918.....	2,641	2,725	3,728	3,791	3,939	3,696	20,520	3,732	3,696	3,832	4,017	3,668	3,586	*22,531	43,051
1919.....	3,651	3,178	3,128	2,631	2,266	2,607	17,461	2,947	3,226	2,718	2,046	2,513	2,784	16,234	33,695
1920.....	3,524	3,402	3,917	3,132	3,423	3,539	20,937	3,328	3,562	3,561	3,581	3,133	2,779	19,944	40,881
1921.....	2,517	1,999	1,795	1,387	1,446	1,146	10,290	918	1,300	1,342	1,847	1,897	1,630	8,934	19,224
1922.....	1,893	2,071	2,814	2,902	3.219	3,128	16,027	2,953	2,629	2,818	3,410	3,430	3,301	18,541	34,568
1923.....	3,841	3,472	*4,067	3,964	*4,216	3,767	*23,327	3,531	3,696	3,357	3,577	3,134	2,863	20,159	43,486
1924.....	3,650	3,826	4,207	3.348	2,640	2,066	19,737	1,878	2,553	2,828	3,125	3,121	3,569	17,074	36,811
1925.....	4,193	3,752	4,194	3,584	3,455	3,205	22,383	3,084	3,421	3,490	3,889	3,903	3,971	21,758	*44,141
1926.....	4,132	3,785	*4,469	4,106	3,928	3,734	*24,154	3,635	3,987	3,913	4,074	3,706	3,467	22,782	*46,936
1927.....	3,823	3,845	*4,575	4,163	4,083	3,526	24,015	3,232	3,529	3,298	3,345	3,155	3,203	19,762	43,777
1928.....	4,028	4,081	4,549	4,345	4,246	3,778	*25,027	3,841	4,217	4,186	*4,693	4,306	4,055	*25,298	*50,325
1929.....	4,545	4,372	*5,118	4,999	*5,339	4,951	*29,324	4,898	4,988	4,573	4,579	3,556	2,932	25,526	*54,850
1930.....	3,808	4,067	4,288	4,142	4,014	3,445	23,764	2,945	3,085	2,863	2,714	2,230	1,995	15,831	39,595
1931.....	2,459	2,502	2,994	2,722	2,505	2,076	15,259	1,886	1,719	1,548	1,592	1,594	....	....	†25,000

Asterisks denote high records. Figures for 1931 are preliminary and do not include electric and crucible ingots.
†Estimated, as to December.

Steel Ingots Made in the United States

(*Gross Tons a Day*)

	Jan.	Feb.	March	April	May	June	First Half	July	Aug.	Sept.	Oct.	Nov.	Dec.	Second Half	Year
1899	30,791	29,899	30,442	31,843	*32,376	*33,169	31,439	*34,246	*34,531	*35,254	*36,557	*37,680	*38,031	*36,039	*33,739
1900	36,244	36,173	35,648	35,732	36,180	35,422	35,899	31,929	28,719	27,394	26,384	26,831	29,071	28,356	32,139
1901	37,364	40,342	41,126	41,746	*43,051	*43,759	*41,213	43,702	42,939	43,174	*44,427	*45,235	40,699	*43,384	*42,303
1902	*45,284	44,164	*45,834	*48,321	*48,939	47,419	*46,693	45,735	46,569	46,497	46,974	46,961	48,760	*46,916	*46,805
1903	45,066	47,111	48,668	*50,857	*52,436	*52,906	*49,510	47,313	48,075	49,128	43,624	32,872	25,909	41,222	45,353
1904	29,186	40,817	45,863	50,973	48,567	42,309	42,985	35,416	37,057	44,339	45,985	48,542	51,064	43,744	43,364
1905	*58,298	57,860	*63,349	*64,980	64,248	60,624	*61,614	56,993	60,320	64,142	*67,174	*68,077	66,931	*63,954	*62,784
1906	*71,406	*72,758	*74,746	73,942	72,439	70,500	*72,626	69,491	66,501	70,295	*75,823	*78,023	77,151	*72,869	*72,747
1907	74,265	76,239	74,967	77,216	77,293	77,749	*76,272	75,950	75,774	75,971	*78,689	63,607	41,559	68,828	72,539
1908	34,617	38,153	40,675	39,342	38,605	37,375	38,105	40,342	45,034	48,561	51,903	53,997	57,654	49,568	43,839
1909	62,412	65,630	63,753	62,387	65,390	69,273	64,791	73,031	78,084	*85,576	*90,256	*91,398	*91,511	*84,976	*74,916
1910	*92,462	*94,024	92,804	90,097	84,720	82,977	*89,624	76,152	74,678	75,242	74,191	69,946	63,015	72,195	*80,881
1911	65,991	74,524	81,441	80,042	71,023	69,285	73,698	67,257	72,268	76,632	78,851	77,498	76,642	74,880	74,289
1912	80,320	87,650	93,879	*95,803	*98,066	*98,439	*92,310	94,057	98,060	*99,369	*104,927	*106,107	*108,610	*101,823	*97,066
1913	104,218	106,757	103,034	106,052	105,220	101,268	*104,419	95,468	94,839	96,543	94,927	86,051	73,954	90,362	*97,364
1914	70,630	78,348	87,972	87,887	78,410	74,239	79,539	73,350	74,759	72,889	66,626	58,786	56,794	67,251	73,376
1915	63,964	74,060	82,432	87,354	90,406	98,264	82,877	102,387	*111,023	*117,733	*124,839	*125,359	*127,946	*118,214	*100,592
1916	*128,195	*132,824	*134,334	134,239	*135,277	133,563	*133,089	129,780	128,943	133,184	*141,224	137,739	127,934	*133,162	*133,125
1917	138,629	128,891	*143,093	*151,665	150,400	139,129	*142,113	137,900	135,683	139,455	145,619	142,843	128,263	138,384	140,255
1918	97,822	113,539	143,370	145,815	145,910	147,814	132,322	143,520	136,875	*153,289	148,794	141,083	143,445	*144,430	138,425
1919	135,224	132,396	120,295	101,202	83,935	104,287	112,651	113,332	124,082	104,539	75,779	100,523	107,077	104,064	108,343
1920	130,519	141,739	145,073	120,480	131,661	136,114	134,213	127,992	137,016	136,976	137,726	120,496	106,874	127,846	131,030
1921	96,810	83,279	66,473	53,342	55,622	44,090	66,387	36,713	48,156	51,619	71,044	72,942	62,707	57,270	61,814
1922	72,764	86,324	104,247	116,090	119,215	120,299	103,401	118,112	97,380	108,395	131,164	131,935	132,017	119,621	111,511
1923	142,263	144,660	150,618	*158,549	156,161	144,894	*149,532	141,258	136,881	134,271	132,485	120,551	114,531	130,056	139,825
1924	135,182	153,050	*161,796	128,787	97,779	82,627	126,519	72,223	98,188	108,755	115,756	124,846	137,279	109,449	117,984
1925	155,307	156,348	161,321	137,834	132,883	123,248	144,407	118,634	131,577	134,214	144,030	156,116	152,728	139,472	*141,932
1926	158,931	157,710	*165,504	157,915	151,076	143,621	*155,831	139,807	153,347	150,515	156,713	142,529	133,339	146,039	*150,920
1927	147,039	160,222	*169,439	160,130	157,023	135,621	154,939	129,285	130,707	126,824	128,664	121,320	123,201	126,676	140,761
1928	154,913	163,231	168,475	*173,805	157,298	145,325	*160,429	153,629	156,192	167,447	*173,810	165,624	162,212	*163,209	*161,818
1929	168,323	*182,150	*196,861	192,273	*197,727	*198,062	*189,187	188,409	184,742	182,910	169,602	136,769	117,271	163,631	*176,368
1930	141,035	169,452	164,915	159,300	148,676	137,817	153,317	113,277	118,648	110,105	100,508	89,185	76,735	101,482	127,316
1931	(a)91,063	104,265	115,139	104,711	96,365	79,843	98,439	72,544	66,133	59,523	58,977	63,747	....	....	†80,386

Asterisks show new high records.
(a)Figures for 1931 do not include electric and crucible steel ingots.
†With December estimated.

Steel Castings Orders in the United States

(*From United States Department of Commerce*)

(*Net Tons*)

	Jan.	Feb.	March	April	May	June	Half Year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Second Half	Year
1920	80,663	85,326	125,952	99,201	97,652	85,795	574,589	78,858	76,932	78,267	56,757	49,668	42,368	382,850	957,439
1921	34,401	33,906	29,260	24,512	23,311	23,739	169,129	20,177	23,327	27,822	38,105	47,286	37,200	193,917	363,046
1922	43,230	46,520	60,080	94,920	97,350	112,120	454,220	83,010	79,560	122,840	94,980	76,400	86,420	543,210	997,430
1923	133,580	117,800	190,030	121,750	120,210	114,820	798,190	70,630	68,660	64,240	51,560	54,620	55,610	365,320	1,163,510
1924	66,360	94,390	129,740	87,930	73,330	62,880	514,630	49,300	46,940	80,690	86,080	95,810	124,130	482,950	997,580
1925	107,170	83,070	82,020	80,940	69,300	68,080	490,580	73,710	69,060	64,420	80,660	90,330	108,979	487,159	977,739
1926	113,223	99,333	113,143	92,694	84,161	72,739	575,293	79,443	70,962	69,495	77,549	73,234	89,805	460,488	1,035,781
1927	108,063	94,939	90,353	81,403	73,043	91,199	539,000	74,569	63,939	52,742	52,160	63,075	77,346	383,831	922,831
1928	91,448	91,076	83,755	84,086	86,796	72,107	509,268	66,992	81,286	82,762	78,860	84,742	96,373	491,015	1,000,283
1929	124,313	115,639	130,836	144,616	113,329	95,201	723,934	103,356	101,777	86,584	136,208	97,888	90,287	616,100	1,340,034
1930	101,728	114,727	122,658	93,200	91,307	61,358	584,978	58,069	50,516	49,539	45,552	48,123	49,387	301,186	886,164
1931	46,810	40,320	48,184	46,039	39,052	26,139	246,544	32,869	27,458	23,073	22,851	20,000	....	....	(a)390,000

(a)With December estimated.

Pig Iron Production of the United States

(THE IRON AGE *figures, including ferroalloys made in blast furnaces, but excluding charcoal iron*)

(Thousands of Gross Tons)

	Jan.	Feb.	March	April	May	June	Half Year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Second Half	Year
1884	308	289	311	302	313	299	1,822	342	321	297	307	304	296	1,867	3,689
1885	278	275	313	297	302	286	1,751	308	305	294	315	333	382	1,937	3,688
1886	368	334	397	*428	*465	455	2,447	*473	460	448	*477	471	*497	*2,826	*5,273
1887	493	463	*522	513	454	359	2,804	413	486	*531	*569	550	548	*3,097	*5,901
1888	507	424	447	453	483	457	2,771	464	492	500	546	566	*616	*3,184	*5,955
1889	601	535	594	564	557	533	*3,384	562	566	564	*626	*642	*684	*3,644	*7,028
1890	*709	653	*734	713	*739	701	*4,249	712	703	706	*742	730	733	*4,326	*8,575
1891	612	492	481	429	512	607	3,133	731	728	726	*789	784	*812	*4,570	7,703
1892	784	745	792	736	732	690	4,479	690	651	635	700	717	747	4,140	*8,619
1893	728	665	754	739	755	674	4,315	564	407	322	326	373	431	2,423	6,738
1894	445	426	534	517	386	319	2,627	441	584	640	691	708	744	3,808	6,435
1895	706	617	672	648	668	679	3,990	776	*827	*845	*923	*926	*934	*5,231	*9,221
1896	873	779	810	785	799	751	4,797	721	608	491	499	550	647	3,516	8,313
1897	702	654	747	728	746	710	4,287	719	764	813	901	927	*986	5,110	*9,397
1898	974	895	*1,000	965	978	910	*5,722	924	915	907	974	985	*1,050	*5,755	*11,477
1899	1,033	906	1,022	1,034	*1,086	1,077	*6,158	*1,149	*1,159	1,145	*1,226	1,223	*1,276	*7,178	*13,336
1900	*1,285	1,158	1,264	1,226	1,282	1,215	*7,430	1,132	1,018	939	935	920	1,031	5,975	*13,405
1901	1,162	1,134	1,279	1,257	*1,339	1,318	*7,489	*1,360	1,336	1,300	*1,382	1,362	1,266	*8,006	*15,495
1902	*1,428	1,258	*1,445	*1,475	*1,543	1,447	*8,595	1,442	1,468	1,419	1,481	1,433	1,537	*8,780	*17,375
1903	1,473	1,391	*1,590	*1,608	*1,714	1,673	*9,449	1,546	1,571	1,554	1,426	1,039	847	7,983	17,432
1904	924	1,208	1,451	1,561	1,537	1,296	7,977	1,121	1,173	1,358	1,455	1,487	1,616	8,210	16,187
1905	*1,782	1,597	*1,936	1,922	*1,964	1,793	*10,994	1,742	1,844	1,899	*2,053	2,014	2,046	*11,598	*22,592
1906	*2,069	1,904	*2,165	2,073	2,097	1,977	*12,287	2,013	1,927	1,971	*2,197	2,188	*2,235	*12,531	*24,818
1907	2,206	2,045	2,226	2,219	*2,295	2,235	*13,226	2,256	2,250	2,184	*2,337	1,828	1,284	12,089	*25,315
1908	1,045	1,078	1,228	1,150	1,166	1,092	6,759	1,218	1,360	1,419	1,567	1,578	1,741	8,883	15,642
1909	1,798	1,707	1,836	1,739	1,883	1,931	10,894	2,103	2,249	*2,385	*2,600	2,547	*2,636	*14,520	*25,414
1910	2,609	2,397	2,618	2,484	2,390	2,265	*14,763	2,149	2,107	2,056	2,093	1,910	1,778	12,093	*26,856
1911	1,759	1,795	2,171	2,065	1,893	1,788	11,477	1,793	1,927	1,977	2,102	2,000	2,043	11,842	23,313
1912	2,058	2,101	2,405	2,375	2,513	2,441	13,893	2,411	2,512	2,464	*2,690	2,631	*2,782	*15,490	*29,383
1913	*2,795	2,586	2,764	2,753	*2,822	2,629	*16,349	2,561	2,546	2,506	2,546	2,233	1,984	14,376	*30,725
1914	1,885	1,888	2,348	2,270	2,093	1,918	12,402	1,958	1,995	1,883	1,778	1,518	1,516	10,648	23,050
1915	1,601	1,675	2,064	2,117	2,263	2,381	12,101	2,563	2,780	*2,853	*3,126	3,037	*3,203	*17,562	29,663
1916	3,185	3,087	*3,339	3,227	*3,361	3,211	*19,410	3,224	3,204	3,202	*3,509	3,312	3,178	*19,629	*39,039
1917	3,151	2,645	3,252	3,335	3,417	3,270	19,070	3,342	3,248	3,134	3,303	3,206	2,883	19,116	38,186
1918	2,412	2,319	3,213	3,288	3,447	3,324	18,003	3,421	3,389	3,418	3,487	3,354	3,434	20,503	38,506
1919	3,303	2,940	3,090	2,478	2,108	2,115	16,034	2,429	2,743	2,488	1,864	2,392	2,633	14,549	30,583
1920	3,015	2,979	3,376	2,739	2,986	3,044	18,139	3,067	3,147	3,129	3,293	2,935	2,704	18,275	36,414
1921	2,416	1,937	1,596	1,193	1,221	1,065	9,428	865	954	986	1,247	1,415	1,649	7,116	16,544
1922	1,645	1,630	2,036	2,072	2,306	2,361	12,050	2,405	1,816	2,034	2,639	2,849	3,087	14,830	26,880
1923	3,229	2,994	*3,524	*3,550	*3,868	3,676	*20,841	3,678	3,450	3,126	3,149	2,894	2,921	19,218	*40,059
1924	3,019	3,075	3,466	3,233	2,615	2,026	17,434	1,785	1,887	2,053	2,477	2,510	2,962	13,674	31,108
1925	3,370	3,214	3,564	3,259	2,931	2,674	19,012	2,664	2,705	2,726	3,023	3,023	3,250	17,391	36,403
1926	3,316	2,923	3,442	3,450	3,482	3,235	19,848	3,223	3,201	3,136	3,334	3,237	3,091	19,222	39,070
1927	3,104	2,941	3,483	3,422	3,391	3,090	19,431	2,951	2,947	2,775	2,784	2,648	2,696	16,801	36,232
1928	2,870	2,900	3,200	3,185	3,284	3,082	18,521	3,072	3,137	3,062	3,374	3,302	3,370	19,317	37,838
1929	3,442	3,206	3,714	3,663	*3,898	3,717	*21,621	3,785	3,756	3,498	3,588	3,181	2,837	20,665	*42,286
1930	2,827	2,839	3,246	3,182	3,233	2,934	18,261	2,639	2,524	2,277	2,165	1,867	1,666	13,139	31,399
1931	1,714	1,707	2,032	2,020	1,994	1,639	11,105	1,463	1,281	1,169	1,173	1,103	....	....	†18,500

*High records for periods specified. †Estimated, as to December.

Pig Iron Made in the United States

(Gross Tons a Day)

	Jan.	Feb.	March	April	May	June	Half Year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Second Half	Year
1884	9,951	9,985	10,019	10,053	10,087	9,966	10,011	11,031	10,348	9,904	9,904	10,126	9,546	10,145	10,078
1885	8,965	9,825	10,106	9,891	9,742	9,527	9,673	9,924	9,855	9,787	10,148	11,113	12,319	10,525	10,103
1886	11,868	11,931	12,817	*14,257	*15,016	*15,159	*13,521	*15,265	14,845	14,910	*15,394	*15,685	*16,041	*15,357	*14,447
1887	15,918	*16,544	*16,826	*17,090	14,633	11,979	*15,489	13,320	15,685	*17,706	*18,846	18,329	17,678	*16,831	*16,167
1888	16,352	14,622	14,422	15,099	15,586	15,239	15,227	14,972	15,869	16,648	17,624	*18,866	*19,871	*17,303	*16,265
1889	19,384	19,124	19,147	18,802	17,980	17,774	*18,699	18,115	18,254	18,809	*20,203	*21,404	*22,053	*19,803	*19,256
1890	*22,888	*23,320	*23,687	*23,759	*23,816	23,380	*23,476	22,979	22,664	23,521	*23,942	*24,321	23,642	*23,507	*23,492
1891	19,747	17,590	15,512	14,301	16,518	20,226	17,312	23,571	23,465	24,194	*25,456	*26,139	*26,206	*24,834	21,104
1892	25,303	25,679	25,551	24,521	23,622	23,006	24,611	22,263	21,012	21,161	22,583	23,886	24,102	22,501	*23,550
1893	23,482	23,758	24,323	24,654	24,357	22,444	23,841	18,179	13,146	10,720	10,518	12,428	13,901	13,166	18,459
1894	14,350	15,203	17,246	17,229	12,450	10,639	14,515	14,221	18,826	21,339	22,284	23,604	24,011	20,695	17,630
1895	22,766	22,024	21,680	21,619	21,556	22,625	22,044	25,035	*26,662	*28,151	*29,788	*30,862	30,143	*28,429	*25,263
1896	28,156	26,861	26,133	26,170	25,784	25,028	26,358	23,255	19,620	16,378	16,079	18,339	20,858	19,107	22,713
1897	22,629	23,375	24,108	24,270	24,063	23,655	23,685	23,210	24,634	27,089	29,071	*30,904	*31,815	27,774	*25,746
1898	31,427	*31,978	*32,262	32,152	31,530	30,334	*31,612	29,817	29,533	30,228	31,406	*32,829	*33,881	31,279	*31,444
1899	33,325	32,360	32,948	*34,464	*35,039	*35,899	*34,020	*37,065	*37,374	*38,156	*39,566	*40,782	*41,162	*39,012	*36,539
1900	*41,441	41,360	40,759	40,856	41,368	40,504	*41,047	36,507	32,839	31,322	30,167	30,678	33,239	32,474	*36,725
1901	37,498	40,487	41,274	*41,896	*43,206	*43,916	*41,377	43,859	43,090	43,329	*44,587	*45,398	40,845	*43,509	*42,452
1902	*46,054	44,915	*46,613	*49,182	*49,769	48,225	*47,488	46,512	47,360	47,287	47,772	47,763	49,589	*47,716	*47,603
1903	47,509	49,665	*51,305	*53,614	*55,278	*55,774	*52,205	49,877	50,681	51,791	45,989	34,654	27,313	43,386	*47,759
1904	29,795	41,668	46,820	52,039	49,580	43,191	43,831	36,155	37,830	45,261	46,944	49,554	52,129	44,616	44,226
1905	*57,479	57,048	*62,460	*64,068	63,346	59,773	*60,739	56,191	59,473	63,317	*66,231	*67,121	65,991	*63,039	*61,896
1906	66,739	*68,001	*69,859	69,107	67,701	65,891	*67,885	64,948	62,153	65,699	*70,865	*72,922	72,107	*68,103	*67,995
1907	71,149	*73,039	71,821	*73,975	*74,049	*74,486	*73,074	72,763	72,594	72,783	*75,386	60,939	39,815	65,701	*69,357
1908	33,718	37,163	39,619	38,320	37,603	36,404	37,139	39,294	43,865	47,300	50,555	52,595	56,158	48,277	42,739
1909	57,986	60,976	59,232	57,963	60,753	64,362	60,189	67,853	72,546	*79,507	*83,856	*84,917	*85,022	*78,915	*69,629
1910	84,149	*85,616	84,450	82,792	77,103	75,516	*81,565	69,305	67,963	68,539	67,520	63,659	57,349	65,719	*73,577
1911	56,752	64,090	70,039	68,839	61,079	59,586	63,376	57,839	62,150	65,903	67,811	66,648	65,912	64,357	63,870
1912	66,384	72,442	77,591	79,181	81,051	81,358	76,334	77,771	81,046	82,128	*86,772	*87,695	*89,766	*84,188	*80,283
1913	*90,172	*92,369	89,147	91,759	91,039	87,619	*90,325	82,601	82,121	83,531	82,139	74,453	63,987	78,129	*84,177
1914	60,808	67,453	75,739	75,665	67,506	63,926	68,519	63,150	64,363	62,753	57,361	50,611	48,896	57,868	63,150
1915	51,659	59,813	66,575	70,550	73,015	79,361	66,855	82,691	89,666	*95,085	*100,822	*101,244	*103,333	95,444	81,267
1916	102,746	*106,456	*107,667	107,592	*108,422	107,053	*106,651	104,017	103,346	106,746	*113,189	110,394	102,505	*106,684	*106,668
1917	101,643	94,473	104,882	111,165	110,239	109,002	105,359	107,820	104,772	104,465	106,550	106,859	92,997	103,892	104,619
1918	77,799	82,839	103,648	109,607	111,175	110,793	99,462	110,354	109,339	*113,942	112,482	111,802	110,762	*111,432	105,496
1919	106,525	105,006	99,685	82,607	68,002	70,495	88,584	78,339	88,496	82,932	60,115	79,745	84,944	79,071	83,788
1920	97,264	102,720	108,900	91,327	96,312	101,451	99,665	98,931	101,529	104,310	106,212	97,830	87,222	99,321	99,492
1921	77,945	69,187	51,468	39,768	39,394	35,494	52,089	27,889	30,780	32,850	40,215	47,183	53,196	38,671	45,325
1922	53,063	58,214	65,675	69,070	74,409	78,701	66,578	77,592	58,586	67,791	85,092	94,990	99,577	80,596	73,645
1923	104,181	106,939	113,673	*118,324	*124,764	122,548	*115,147	118,656	111,274	104,184	101,586	96,476	94,225	104,444	*109,713
1924	97,384	106,026	111,809	107,781	84,358	67,539	95,794	57,577	60,875	68,439	79,907	83,656	95,539	74,314	84,995
1925	108,720	114,791	114,975	108,632	94,542	89,115	105,039	85,936	87,241	90,873	97,528	100,767	104,853	94,519	99,831
1926	106,974	104,408	111,032	115,004	112,304	107,844	109,660	103,978	103,241	104,543	107,553	107,890	99,712	104,467	107,043
1927	100,123	105,024	112,366	114,074	109,385	102,988	107,351	95,199	95,073	92,498	89,810	88,279	86,960	91,313	99,266
1928	92,573	100,004	103,215	106,183	105,931	102,733	101,763	99,091	101,180	102,077	108,832	110,084	108,705	104,983	103,382
1929	111,044	114,507	119,822	122,087	*125,745	123,908	*119,562	122,100	121,151	116,585	115,745	106,047	91,513	112,307	*115,851
1930	91,209	101,390	104,715	106,062	104,283	97,804	100,891	85,146	81,417	75,890	69,831	62,237	53,732	71,401	86,025
1931	55,299	60,950	65,556	67,317	64,325	54,621	61,356	47,201	41,308	38,964	37,848	36,782	....	....	†50,685

*High records for periods specified.
†With December estimated.

Fabricated Structural Steel Orders in the United States

(From United States Department of Commerce)

(Computed Net Tons)

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1909	70,200	70,200	187,200	261,000	280,800	160,200	192,600	205,200	109,800	97,200	127,800	131,400	1,893,600
1910	159,360	128,640	167,040	153,600	192,000	205,440	101,760	115,200	78,720	76,800	63,360	90,240	1,532,160
1911	114,800	94,300	135,300	114,800	129,150	159,900	141,450	166,050	153,750	106,600	180,400	178,350	1,674,850
1912	154,070	169,260	147,560	128,030	219,170	160,580	154,070	175,770	141,050	199,640	138,880	145,390	1,933,470
1913	130,500	162,000	110,250	90,000	119,250	96,750	130,500	96,750	65,250	78,750	60,750	60,750	1,201,500
1914	140,740	143,010	172,520	199,760	129,390	127,120	154,360	63,560	86,260	79,450	45,400	79,450	1,421,020
1915	57,750	69,300	147,840	143,220	140,910	184,800	198,660	196,350	154,770	180,180	242,550	279,510	1,995,840
1916	164,220	178,500	242,760	173,740	190,400	138,040	114,240	152,320	126,140	183,260	185,640	204,680	2,053,940
1917	147,620	142,780	164,560	147,620	135,520	113,740	101,640	91,960	70,180	147,620	186,340	275,880	1,725,460
1918	136,740	144,480	121,260	165,120	154,800	144,480	299,280	147,060	154,800	110,940	69,660	74,820	1,723,440
1919	31,920	34,580	47,880	66,500	130,340	172,900	196,840	207,480	207,480	207,480	183,540	226,100	1,713,040
1920	207,000	262,200	231,840	187,680	171,120	138,000	138,000	110,400	118,680	71,760	74,520	71,760	1,782,960
1921	50,940	39,620	82,070	87,730	79,240	104,710	96,220	93,390	135,840	152,820	155,650	113,200	1,191,430
1922	121,600	133,760	234,080	258,400	240,160	221,920	206,720	206,720	194,560	176,320	152,000	185,440	2,331,680
1923	227,760	243,360	290,160	243,360	180,960	165,360	162,240	184,080	165,360	159,120	171,600	249,600	2,442,960
1924	224,940	228,200	221,680	208,640	192,340	208,640	224,940	192,340	211,900	211,900	267,320	247,760	2,640,600
1925	187,380	194,320	225,550	256,780	229,020	284,540	274,130	267,190	270,660	298,420	239,430	253,310	2,980,730
1926	208,800	208,800	234,000	252,000	266,400	262,800	248,400	234,400	216,000	230,400	223,200	259,200	2,894,400
1927	195,000	243,750	232,500	262,500	232,500	225,000	341,250	270,000	262,500	288,750	236,250	262,500	3,052,500
1928	211,750	265,650	257,950	234,350	308,000	300,000	296,450	354,200	319,550	250,250	242,550	246,400	3,287,600
1929	273,350	265,650	358,050	334,950	342,650	346,500	350,350	361,900	319,550	342,650	227,150	319,550	3,842,300
1930	252,000	284,000	284,000	236,000	296,000	272,000	284,000	264,000	155,600	209,200	151,200	152,800	2,804,800
1931	162,400	158,400	184,400	292,800	152,800	177,200	159,200	124,400	196,800	110,000	87,200	.....	†1,890,000

†With December estimated.

Bookings of Fabricated Steel Plate in the United States

(From United States Census Bureau)

(Net Tons)

	Jan.	Feb.	March	April	May	June	Half Year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Second Half	Year
1923	64,832	61,797	75,062	59,850	40,081	62,739	364,361	62,510	40,990	42,945	38,598	31,846	28,806	245,695	610,056
1924	25,563	19,803	25,339	23,688	29,429	34,127	157,949	26,268	36,287	23,270	28,566	36,881	52,606	203,878	361,827
1925*	30,013	24,167	26,777	27,656	32,889	38,496	179,998	34,382	40,660	31,001	34,766	32,847	35,792	209,448	389,446
1926*	29,965	39,889	43,088	39,662	52,890	44,939	250,439	37,300	51,339	38,863	45,139	63,271	30,034	265,939	516,378
1927	36,039	59,847	55,675	47,611	38,060	28,939	266,171	35,609	48,780	38,860	47,299	27,524	35,877	233,949	500,120
1928	51,647	64,909	55,016	55,552	49,312	40,739	317,175	41,629	51,008	43,499	59,839	62,914	52,201	311,090	628,265
1929	40,570	70,314	69,344	54,246	58,293	57,975	350,739	58,456	51,590	51,839	45,664	52,639	27,745	287,936	638,675
1930	57,083	34,662	46,139	45,454	38,326	41,774	263,439	38,283	36,513	41,066	30,197	33,151	26,787	205,996	469,435
1931	27,518	24,439	31,056	29,916	26,210	22,806	161,945	27,261	24,282	33,473	20,839	18,268	....	....	†305,000

*During these years additional plants were added to those reporting monthly tonnages.
†With December estimated.

Steel Sheets Produced in the United States

(National Association of Sheet and Tin Plate Manufacturers)

(Black, Blue Annealed, Galvanized and Full-Finished, Net Tons)

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1919	132,796	127,168	110,339	112,720	108,739	119,363	115,324	129,861	102,035	79,872	128,617	143,405	1,410,239
1920	185,271	177,410	198,606	165,811	161,645	166,819	142,023	188,458	198,467	202,703	185,450	85,204	2,057,867
1921	37,011	45,520	74,239	85,592	106,969	83,374	49,096	94,900	106,454	131,577	127,983	82,198	1,024,913
1922	86,130	122,439	166,244	184,979	218,739	210,464	179,100	228,398	202,600	243,476	242,562	205,239	2,290,370
1923	260,520	237,919	279,475	251,808	260,006	218,432	174,910	234,112	185,577	225,714	188,144	155,299	2,671,916
1924	274,097	275,118	278,767	234,000	176,582	114,807	144,291	190,439	217,978	247,222	224,931	259,794	2,638,026
1925	317,424	283,290	290,308	280,082	260,470	266,290	246,404	270,212	295,810	348,714	336,021	326,960	3,521,985
1926	328,639	299,557	319,132	294,811	264,539	268,450	239,764	293,703	307,459	314,598	278,455	238,345	3,447,452
1927	256,856	282,172	359,339	316,100	309,360	300,706	237,239	266,649	220,919	245,767	230,039	260,130	3,285,276
1928	316,539	330,567	366,127	327,909	349,368	311,629	267,684	329,396	318,907	369,239	358,406	302,182	3,947,953
1929	391,404	326,468	364,202	375,256	393,432	337,839	323,905	366,734	302,490	319,660	204,071	181,916	3,887 377
1930	291,529	275,952	259,658	308,988	274,220	205,675	186,206	173,956	179,928	193,934	148,550	145,125	2,643,721
1931	167,865	192,218	224,323	213,609	201,848	147,839	174,890	123,752	116,839	122,739	102,758	....	*1,875,000

*With December estimated.

Shipments of Steel Barrels in the United States

(From United States Department of Commerce)

(Number)

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1921	120,903	125,789	140,382	191,155	137,862	137,766	148,852	239,263	180,172	255,229	200,306	190,778	2,068,457
1922	178,432	203,060	336,952	400,428	450,744	533,888	441,984	488,542	412,896	378,966	388,139	402,639	4,616,670
1923	457,824	431,093	565,718	544,722	520,978	461,250	468,048	482,504	365,580	393,496	343,472	321,439	5,356,124
1924	303,668	362,725	394,756	420,129	425,397	382,550	407,258	398,312	389,064	441,851	389,230	407,474	4,722,414
1925	415,039	407,782	510,928	605,424	569,670	508,880	506,891	495,739	503,221	555,981	498,070	474,742	6,052,367
1926	469,432	518,104	622,312	608,056	582,352	624,083	593,610	511,542	508,548	497,031	505,383	546,392	6,586,845
1927	525,518	503,182	568,821	609,090	575,712	605,123	576,602	610,454	525,374	572,893	497,344	454,639	6,624,753
1928	474,159	514,362	644,521	661,949	694,843	717,496	645,881	675,600	595,639	661,010	568,353	549,913	7,403.726
1929	548,581	563,532	743,407	775,481	834,699	779,567	782,411	809,860	653,890	638,681	567,257	618,003	8,315,369
1930	643,120	643,324	856,451	766,617	736,147	638,358	621,091	552,265	565,204	619,558	497,539	412,283	7,551,957
1931	421,814	450,139	550,583	591,394	610,788	552,955	580,565	449,590	451,562	489,555	453,547	.....	†6,050,000

Malleable Castings Produced in the United States

(From United States Department of Commerce)

(Net Tons)

	Jan.	Feb.	March	April	May	June	Half Year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Second Half	Year
1923	.....	.....	.....	.....	.....	72,413	.....	62,275	72,115	64,110	65,008	53,892	50,982	368,382	.....
1924	64,339	66,436	69,574	56,897	48,552	33,323	339,121	30,070	34,350	39,261	47,305	45,279	55,028	251,293	590,414
1925	62,829	56,399	57,304	59,046	57,289	55,143	348,010	53,450	53,221	54,943	64,216	58,315	61,791	345,936	693,946
1926	72,417	62,574	70,474	62,812	55,803	56,659	380,739	51,568	53,796	54,630	53,963	43,214	46,977	304,148	684,887
1927*	56,627	62,335	72,205	64,612	62,747	64,310	382,836	53,046	57,096	50,807	52,458	46,698	53,824	313,929	696,765
1928	61,072	65,359	70,070	63,380	67,903	67,090	394,874	60,290	68,606	62,665	70,054	63,560	59,428	384,603	779,477
1929	73,125	73,875	83,365	83,765	81,704	72,282	468,116	70,625	68,651	59,589	65,305	46,448	45,083	355,701	823,817
1930	61,381	65,939	63,464	61,984	53,502	39,339	345,609	30,911	25,614	26,528	28,785	27,114	30,431	169,383	514,992
1931	31,267	33,587	35,210	36,074	31,450	23,839	191,427	19,943	18,531	18,193	20,123	17,678	.....	.....	†300,000

*A larger number of firms reported monthly production for 1927 and later years.
Figures prior to June, 1923, not available.
†With December estimated.

Automobiles Produced in the United States

(Cars and Trucks)

(From United States Department of Commerce)

	Jan.	Feb.	March	April	May	June	Half Year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Second Half	Year
1922	91,292	122,531	172,998	219,889	256,582	289,407	1,152,699	247,186	274,209	207,206	239,406	237,329	228,410	1,433,746	2,586,445
1923	244,302	277,601	358,779	377,939	393,823	378,558	2,031,002	330,039	346,843	327,892	365,451	313,597	305,431	1,989,253	4,020,255
1924	318,526	370,319	382,718	375,858	314,105	251,775	2,013,301	270,312	284,649	296,333	294,643	234,615	207,065	1,587,617	3,600,918
1925	240,578	283,639	374,406	433,792	419,056	398,524	2,149,995	398,947	260,236	325,728	441,981	372,271	316,672	2,115,835	4,265,830
1926	308,998	363,652	433,467	439,336	425,167	386,269	2,356,889	359,610	426,851	398,939	334,420	256,301	167,924	1,944,045	4,300,934
1927	238,904	304,739	394,513	406,382	405,648	323,817	2,074,003	269,396	309,994	260,310	219,682	134,370	133,571	1,327,323	3,401,326
1928	231,728	323,796	413,314	410,104	425,783	396,795	2,201,520	392,087	461,298	415,314	397,284	257,139	234,117	2,157,239	4,358,759
1929	401,039	466,416	585,455	621,910	604,691	545,932	3,225,443	500,840	498,628	415,912	380,017	217,573	120,007	2,132,977	5,358,420
1930	273,221	330,414	396,388	444,039	420,027	334,506	2,198,595	265,533	224,368	220,649	154,401	135,754	155,701	1,157,391	3,355,986
1931	171,848	219,939	276,406	336,939	317,163	250,639	1,572,935	218,491	187,197	140,566	80,142	68,867	.....	*800,000	*2,373,000

In no year prior to 1922 did total United States production reach 2,200,000 units.
*With November and December estimated.

Railroad Freight Cars Ordered in the United States

(From Railway Age)

	Jan.	Feb.	March	April	May	June	Half Year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Second Half	Year
1915	3,300	4,255	1,188	1,000	41,110	11,964	62,817	7,935	16,300	5,062	30,508	15,700	10,834	86,339	149,156
1916	25,613	10,523	16,308	8,228	7,204	5,571	73,447	2,823	3,644	9,128	21,031	40,839	18,335	95,800	169,247
1917	9,106	14,131	17,282	3,623	3,828	21,465	69,435	6,770	465	605	46,700	10,839	2,433	67,812	137,247
1918	480	5,599	8,500	1,244	95,745	4,500	116,068	10,000	0	0	51,995	80	4,050	66,125	182,193
1919	0	1,100	5	166	778	1,161	3,210	1,020	3,946	2,504	8,936	1,631	1,557	19,594	22,804
1920	3,220	6,908	4,294	19,670	7,609	4,132	45,833	5,534	7,056	3,194	6,055	2,350	50	24,239	70,072
1921	0	2,945	0	1,320	10	800	5,075	25	0	400	3,720	7,715	1,590	13,450	18,525
1922	8,210	14,771	5,575	30,677	18,439	11,095	88,767	15,825	776	6,779	14,521	6,589	28,490	72,980	161,747
1923	11,170	10,266	34,514	9,744	150	1,755	67,599	1,047	1,310	1,920	739	1,110	15,004	21,130	88,729
1924	7,300	18,395	35,846	11,189	443	412	73,585	2,187	4,866	22,845	11,866	13,039	9,539	64,342	137,927
1925	10,312	5,477	4,703	5,714	8,974	777	35,957	1,146	2,974	6,163	6,051	13,922	13,839	44,095	80,052
1926	11,631	11,353	8,844	4,490	843	4,270	41,431	1,256	366	2,564	2,975	2,732	5,831	15,724	57,155
1927	17,321	4,185	5,253	3,414	4,553	7,609	42,335	1,439	1,208	357	9	903	13,339	17,255	59,590
1928	3,298	7,068	1,997	5,683	2,523	2,263	22,832	3,657	822	1,350	1,639	6,200	4,739	18,407	41,239
1929	12,477	14,513	12,508	7,083	8,364	5,869	60,814	442	2,585	4,257	17,347	5,939	9,785	40,355	101,169
1930	6,632	15,931	4,464	1,543	1,079	794	30,443	1,348	781	565	3,291	2,862	1,691	10,539	40,982
1931	0	24	2,166	2,768	46	972	5,976	443	534	3	798	28	.....	*1,900	*7,900

*With December estimated; 1930 figures are revised.

Production of Steel Trackwork in the United States

(For tee-rail track of 60 lb. and over)

(From American Iron and Steel Institute, in Net Tons)

	Jan.	Feb.	March	April	May	June	Half Year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Second Half	Year
1925	11,096	14,392	17,965	16,792	17,075	17,416	94,736	13,858	12,982	11,373	12,689	12,281	13,475	76,658	171,394
1926	15,247	16,158	19,756	19,547	19,196	18,762	108,666	15,635	15,203	15,159	15,568	12,225	14,549	87,339	196,005
1927	12,969	13,678	19,216	17,081	16,768	14,557	94,269	13,217	13,387	10,999	9,914	9,706	9,139	66,362	160,631
1928	9,332	11,371	15,058	13,511	14,139	13,718	77,129	11,776	11,039	10,768	9,493	8,379	11,061	62,516	139,645
1929	10,344	12,180	14,927	16,815	16,332	14,839	85,437	13,844	14,818	12,962	12,902	11,326	10,826	76,678	162,115
1930	11,830	12,524	13,096	13,508	12,779	10,553	74,290	8,774	6,812	5,642	5,192	4,212	5,174	35,806	110,116
1931	5,626	6,321	8,944	8,564	7,453	5,705	42,613	4,409	3,924	3,472	2,162	1,948	.....	*18,000	*60,600

*With December estimated.

Locomotives Ordered in the United States

(From Railway Age)

	Jan.	Feb.	March	April	May	June	Half Year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Second Half	Year
1915	39	152	114	20	116	564	1,005	24	158	176	299	216	126	999	2,004
1916	233	401	1,095	190	278	387	2,584	51	185	262	268	930	996	2,692	5,276
1917	425	721	272	324	784	684	3,210	218	18	270	927	206	0	1,639	4,849
1918	194	91	0	106	1,053	390	1,834	515	0	15	750	0	19	1,299	3,133
1919	0	129	0	28	218	46	421	23	186	22	86	8	0	746	1,167
1920	239	379	317	539	206	105	1,785	172	39	181	172	86	94	744	2,529
1921	10	4	68	153	68	23	326	75	69	35	119	60	55	413	739
1922	5	8	77	298	136	37	561	362	249	619	186	248	202	1,866	2,427
1923	374	486	539	152	94	152	1,797	11	10	18	51	49	23	162	1,959
1924	131	93	284	104	163	4	779	96	15	115	139	93	173	631	1,410
1925	52	49	107	96	79	42	425	61	41	97	236	118	239	792	1,217
1926	64	14	421	74	73	193	839	22	86	34	80	226	52	500	1,339
1927	26	85	85	29	185	73	483	1	28	11	14	22	144	220	703
1928	14	29	15	35	66	11	170	39	86	9	4	39	62	239	409
1929	32	82	152	69	50	181	566	36	46	87	139	77	168	553	1,119
1930	163	16	43	29	18	0	269	2	34	25	7	4	60	132	401
1931	2	8	8	7	151	2	178	3	6	1	0	20	...	*42	*220

*With December estimated; 1930 figures are revised.

Unfilled Orders, United States Steel Corporation

(End of month, in thousands of gross tons)

	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Jan.	(a)	3,111	5,380	7,827	4,614	4,249	7,923	11,474	9,478	6,684	9,285	7,573	4,242	6,911	4,798	5,037	4,883	3,800	4,276	4,109	4,469	4,132
Feb.	(a)	3,401	5,454	7,657	5,026	4,345	8,569	11,577	9,288	6,011	9,502	6,934	4,141	7,284	4,913	5,285	4,617	3,597	4,398	4,144	4,480	3,965
Mar.	5,403	3,447	5,305	7,469	4,654	4,256	9,331	11,712	9,056	5,431	9,892	6,285	4,494	7,403	4,783	4,864	4,380	3,553	4,335	4,411	4,570	3,995
April	(a)	3,219	5,665	6,979	4,277	4,162	9,830	12,183	8,742	4,801	10,360	5,845	5,097	7,289	4,208	4,447	3,868	3,456	3,872	4,428	4,354	3,898
May.	(a)	3,113	5,751	6,324	3,998	4,265	9,939	11,887	8,339	4,282	10,940	5,482	5,254	6,981	3,628	4,050	3,649	3,051	3,417	4,304	4,059	3,620
June	4,258	3,361	5,807	5,807	4,033	4,678	9,639	11,383	8,918	4,893	10,979	5,118	5,636	6,386	3,263	3,710	3,479	3,053	3,637	4,257	3,968	3,479
July	3,971	3,696	5,957	5,399	4,159	4,929	9,594	10,844	8,884	5,579	11,118	4,830	5,776	5,911	3,187	3,539	3,603	3,142	3,571	4,088	4,022	3,407
Aug.	3,537	3,584	6,163	5,223	4,213	4,908	9,660	10,407	8,759	6,109	10,805	4,532	5,950	5,415	3290	3,513	3,542	3,196	3,624	3,658	3,580	3,169
Sept.	3,158	3,611	6,552	5,004	3,788	5,318	9,523	9,833	8,298	6,285	10,375	4,561	6,692	5,036	3,474	3,717	3,594	3,148	3,698	3,903	3,424	3,145
Oct.	2,872	3,694	7,594	4,514	3,461	6,165	10,015	9,010	8,353	6,473	9,837	4,287	6,902	4,673	3,525	4,109	3,684	3,341	3,751	4,087	3,482	3,119
Nov.	2,760	4,142	7,853	4,396	3,325	7,189	11,059	8,897	8,125	7,128	9,021	4,251	6,840	4,369	4,032	4,582	3,807	3,454	3,673	4,125	3,639	2,934
Dec.	2,675	5,085	7,932	4,282	3,837	7,806	11,547	9,382	7,379	8,265	8,148	4,268	6,746	4,445	4,817	5,033	3,961	3,973	3,977	4,417	3,944	....
Ave.	....	*3,622*	*6,284*	*5,907*	*4,115*	*5,189*	*9,719*	*10,716*	*8,635*	*5,995*	*10,022*	*5,331*	*5,648*	*6,009*	*3,993*	*4,324*	*3,922*	*3,397*	*3,852*	*4,161*	*3,999*	....

(a) Figures were reported quarterly, prior to July, 1910.
Average for 1930 is for 11 months only.

"PIONEERS IN CONTINUOUS SHEET ROLLING"

How an automobile maker cut his scrap loss in half

This is the story of an automobile manufacturer who reduced his scrap loss one-half in the course of a year. And he did it with special Armco steel sheets—sheets made expressly for his individual needs.

For three years this manufacturer's rejections had cost him $23,000 annually. One year after he had standardized on Armco stamping and drawing sheets. his scrap losses had shrunk to $10,000—a saving of $13,000.

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NEW STEEL CAPACITY OF 4,075,000 TONS POST-WAR RECORD—NO NEW BLAST FURNACES

EXPANSION in respect to new steel making capacity last year was 4,075,000 gross tons, which is a record for any year since the war. The large increase is due to the completion by the two leading companies of new furnaces which were projected during 1929 and not completed until last year. As might be expected, new capacity for erection this year is very light, amounting to 100,000 tons, or the smallest in many years.

Important facts regarding new construction and equipment added in 1931 or planned for 1932 are given in the following, according to information supplied by companies having blast furnaces, steel plants and rolling mills as well as by some foundries.

New Open-Hearth Capacity Last Year

Reports from these companies show that 38 open-hearth furnaces were completed last year, having an estimated steel making capacity of 4,075,000 tons. This compares with 12 furnaces in 1930 credited with 845,000 tons and with 11 in 1929 with a capacity of 1,005,000 tons, at that time the post-war record. The 1931 total is close to the war peak of 4,205,000 tons in 1916 for 103 furnaces.

The following companies made additions to their open-hearth facilities last year:

Bethlehem Steel Corpn., Lackawanna plant, six 150-ton furnaces and also six 150-ton furnaces at its Maryland plant; United States Steel Corpn., 14 furnaces at its South Chicago works and seven furnaces at the Gary works of the Illinois Steel Co. at Chicago with the size of the furnaces not given; a three-furnace duplex plant at the National works of the National Tube Co., at McKeesport, Pa., and a new furnace at the Fairfield plant of the Tennessee Coal, Iron & Railroad Co., at Birmingham. A 10-ton furnace was built by the Sterling Steel Foundry Co., Braddock, Pa.

The completion of these furnaces virtually finishes the program under way on Jan. 1, 1930. Two large furnaces, announced a year ago, to be built during 1931 by the Wisconsin Steel Co., are not mentioned this year.

Little New Capacity This Year

New open-hearth capacity for completion this year is meager and confined to the Ford Motor Co., which is

to substitute a tilting 400-ton furnace for a stationary 100-ton. It also will erect two 600-ton mixers in place of one dismantled. Rebuilding and at the same time enlarging of existing open-hearth furnaces by several companies is reported.

No New Blast Furnaces

No new blast furnaces were built during 1931 and none are reported as scheduled for erection in 1932. This compares with one 600-ton furnace added in 1930. In two other years since the war no new furnaces were added—1923 and 1927. The years of largest increased capacity since the war were in 1920 and 1926, when six furnaces were completed each year, with a capacity respectively of 875,000 and 1,255,000 tons. There were five post-war years when only one furnace was added—1921, 1924, 1925, 1929 and 1930, but there were two additions each year in 1919, 1922 and 1928. Since the war 23 new furnaces have been built.

Rebuilding on original sites of two blast furnaces is reported by the Bethlehem organization at two of its plants and there is the usual remodeling of old furnaces by a number of companies.

New Rolling Mill Capacity Large

A feature of last year's expansion, besides that in the open-hearth, was new rolling mill capacity. An examination of the companies' reports will show the installation of several large blooming, slabbing and bar mills by the two leading factors, and by several other companies.

It has not been possible to obtain data as to expansion in the electric furnace industry. This is known to have been active particularly as to installations for melting gray iron in the manufacture of high-test and alloy iron castings. Interest in the high-frequency furnace for melting steel has continued, but the depression has retarded expansion in this as in other types. A feature of the year is the installation of a large Ajax high-frequency furnace at the South Chicago plant of the Illinois Steel Co., which melts approximately two tons an hour or, conservatively, 40 tons a day.

Some of the main facts taken from reports which steel companies have sent to THE IRON AGE are as follows:

What the Steel Companies Are Doing

The Steel Corporation

New construction completed during 1931 and under way as of Jan. 1, 1932, by subsidiary manufacturing companies of United States Steel Corpn. is as follows:

CARNEGIE STEEL COMPANY

Completed

Edgar Thomson Works: 15-ton ore bridge at stockyard of blast furnaces "J" and "K."

Duquesne Works: Improvements to blast furnace No. 2 and the electrification of roughing and finishing mill drives at 22-in. mill No. 5.

Homestead Works: Additional charging equipment and improvement to pouring facilities and furnaces at No. 4 open-hearth plant.

Carrie Furnaces: Improvements to blast furnace No. 2.

Schoen Steel Wheel Works: Heat-treating plant and equipment to manufacture "Tri-lok" floor reinforcement.

Clairton Works: Electric stripper crane and extending soaking pit building; also coal cleaning plant at by-product coke ovens.

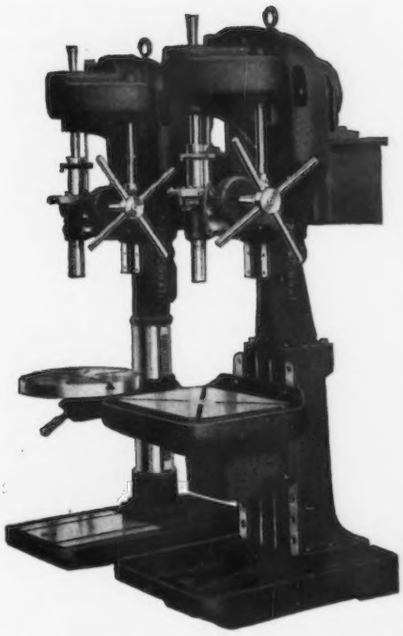
Mingo Works: Additions to furnace, stock trestle and bins at blast furnace No. 2.

McDonald Mills: New 10-in. bar mill, No. 17.

ILLINOIS STEEL CO.

Completed

South Works: Improvements to blast



Round and Box Column Direct Drive Uprights—Built in 21" and 24" Sizes. —And Gang Drills of all Types.

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Modern Drilling Machines

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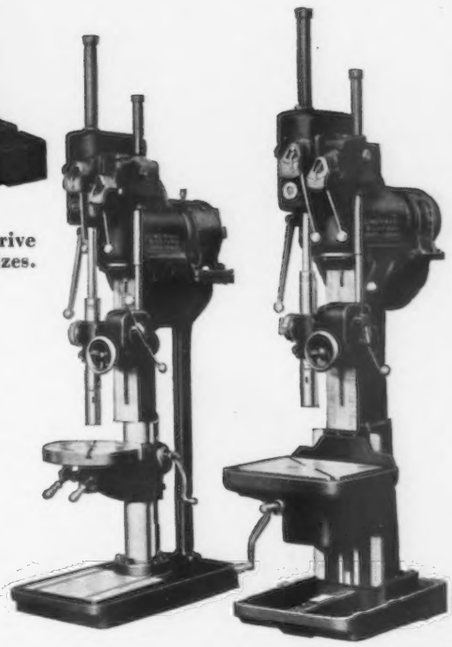
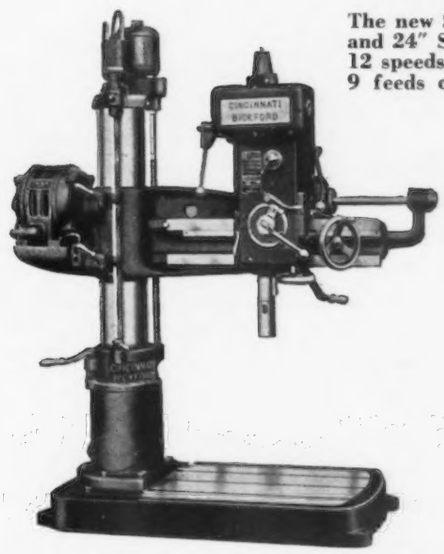
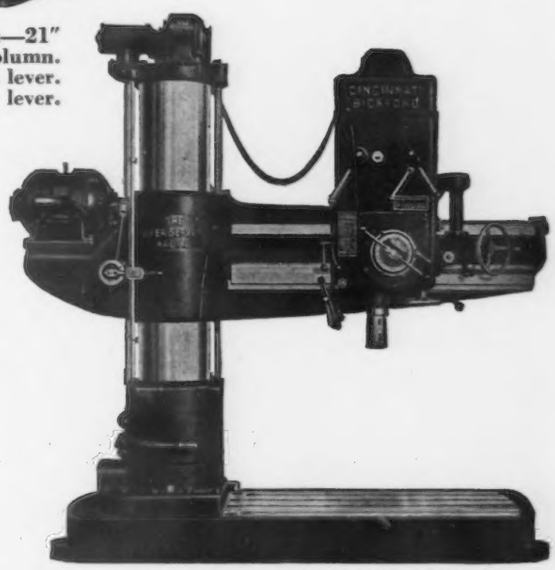
No matter what your drilling requirements, whether high production or small quantities, you can save drilling time and money by installing a Cincinnati Bickford drill. Many years of specializing on metal drilling machinery qualifies us to help you in selecting the proper drilling machine for your work. Send prints for our recommendations.



The new Super Service Uprights—21" and 24" Sizes, Round or Box Column. 12 speeds controlled by a single lever. 9 feeds controlled by a single lever.



The new 2-A Radial has a 3' arm mounted on a 9" column and has 12 speeds in the head, ranging from 71 to 1,500 r.p.m.



THE SUPER SERVICE RADIAL
3' to 8' Sizes. Centralized Control. Write for detailed information.

THE CINCINNATI BICKFORD TOOL COMPANY

OAKLEY, CINCINNATI, OHIO

furnace No. 4, six gas-driven blowing engine units to modernize and improve blowing facilities; a 14-furnace open-hearth plant and a 44-in. blooming and slabbing mill, as well as a wide flange beam mill; a 96-in. continuous plate mill and a 10-in. alloy bar mill; additions at ingot mold foundry; a 20,000-kw. steam-driven electric generating station and a flue dust sintering plant and facilities for flue dust recovery.

Gary Works: A 7-furnace open-hearth plant and a 44-in. slabbing and blooming mill, lengthening blast furnace ore yard, eight 150-ton mixer type iron ladles at blast furnaces, pickling facilities for strip steel, heat-treating equipment for steel wheels and a flue dust sintering plant.

Under Way

South Works: Extending ore handling facilities at blast furnaces Nos. 5 to 10.

Gary Works: Two additional batteries of 69 ovens each at by-product coke plant.

THE LORAIN STEEL CO.

Completed

Johnstown Works: Remodeling portion of steel foundry and modernizing equipment.

NATIONAL TUBE CO.

Completed

National Works: 3-furnace duplex open-hearth plant and auxiliaries, changes and additions to blooming and slabbing mills, including new 32-in. reversing bar mill and Nos. 1 and 2 seamless pipe mills; additional equipment for 32-in. reversing bar mill, and normalizing facilities for high tensile drill pipe and casing.

Gary Works: New No. 2 seamless mill for tubular goods ranging from 3½ in. to 8⅝ in. outside diameter in lengths up to 45 ft.

AMERICAN STEEL & WIRE CO.

Completed

Cuyahoga Works: Additional facilities for manufacture of cold rolled strip steel.

Donora Steel Works: New billet mill and two rod mills.

AMERICAN SHEET & TIN PLATE CO.

Completed

Gary Tin Works: Additional finishing and handling facilities for strip steel at continuous mill.

National Works: Reconstructing tin house and installing additional double tinning units.

Gary Sheet Works: Two continuous-pack furnaces.

Vandergrift Works: Continuous pack furnace and continuous pair furnace.

Under Way

Gary Tin Works: Four high cold reduction mill and equipment for continuous finishing and tinning cold rolled strip.

Gary Sheet Works: Two continuous pack furnaces and one continuous pair furnace.

TENNESSEE COAL, IRON & RAILROAD CO.

Completed

Fairfield Works: New open-hearth furnace No. 9, additional soaking pit and improved shipping facilities at 45-in. blooming mill and new 42-in. universal plate and strip mill.

Under Way

Fairfield Works: Extension of sheet mills.

Additions to Open-Hearth Capacity Since the War

Year	Annual Capacity, Gross Tons	Year	Annual Capacity, Gross Tons
1920	675,000	1926	865,000
1921	247,500	1927	630,000
1922	227,500	1928	895,000
1923	875,000	1929	1,005,000
1924	375,000	1930	845,000
1925	585,000	1931	4,075,000

Bethlehem Steel Corpn.

Subsidiary companies of Bethlehem Steel Corpn. report the following principal improvements and additions completed in 1931 and under way at the close of the year:

COMPLETED

Bethlehem Plant, Bethlehem, Pa.: New ladle cranes, ladles and runways for No. 2 open-hearth department; apparatus for recovery of cyanogen at coke ovens.

Maryland Plant, Sparrows Point, Md.: New central dispensary; boiler house and two steam generators at blast furnace department; new open-hearth department, consisting of six furnaces; 40-in. universal slabbing mill with eight soaking pits; 160-in. sheared plate mill; automatic squaring shear and scrap baler at sheet mills; new patenting furnaces and equipment at wire mills; building and equipment for flanged and dished plate products.

Lackawanna Plant, Lackawanna, N. Y.: Complete rebuilding of by-products department at coke ovens, including extension to benzol department; gas cleaning and distributing system for blast furnace gas; gas washers at three blast furnaces; new stack to replace former "G" blast furnace stack; new open-hearth department, consisting of six furnaces; shear, shear tables and crane at structural shipping yards.

Cambria Plant, Johnstown, Pa.: Gas cleaning equipment at Franklin and Lower divisions; gas holder at coke ovens; ore bins, coke screening station and three scale cars for blast furnaces; gas fuel lines for Franklin division; three ingot slicing machines and six cold saws for wheel mills.

UNDER WAY

Maryland Plant, Sparrows Point, Md.: New turbo blower for blast furnaces; new blast furnace "D" replacing present "D" furnace; gas cleaning and distributing system for blast furnace gas; three gas disintegrators, moisture eliminator, and mains for clean blast furnace gas.

Cambria Plant, Johnstown, Pa.: Heat-treating department at wheel mills.

Pacific Coast Steel Corpn.

COMPLETED

Los Angeles Plant, Los Angeles, Cal.: Acquisition of site and erection of warehouse.

Seattle Plant, Seattle, Wash.: Additions to 22-in. and 16 to 12-in. mills and bending department buildings.

Youngstown Sheet & Tube Co.

The Youngstown Sheet & Tube Co., Youngstown, Ohio, completed during 1931, at its various plants, the following construction work:

CAMPBELL WORKS

Bessemer Plant: A new 200-ton ladle crane at the Bessemer plant, with necessary changes to ladles and pig casting machine.

Open-Hearth Department: Installed an ingot jarring machine for making more solid ingots; necessary equipment for hot topping steel by using the new "C & D" re-usable tops, and a new leanto for housing equipment; installed a dolomite slag lime machine; a temperature reversing control equipment and a carbometer equipment for determining carbon content of open-hearth steel.

Sheet Mills: Two continuous pair furnaces, each serving two roughing mills; two continuous pack furnaces, each serving one finishing mill; each of the finishing mills equipped with mechanical feeder, catcher, and polisher. Also necessary conveyors for delivering breakdowns and partly finished packs for reheating, packs to doublers and to squaring shears. Installed new roller leveller and stretcher leveller in the finishing end.

Tube Mills: An entire new galvanizing plant, including building for housing the new equipment. Equipped billet heating furnace at No. 14 seamless mill with raw producer gas burners, making necessary changes to furnace, and installing a new blower; additions to Pilger mill, consisting of a modern automatic or plug mill, with one reheating furnace following the Pilger rolls, two reelers, two sizing machines, one normalizing furnace, one large straightener, new roll and mandrel shop, additional finishing equipment, and relocation of upsetting plant. These changes necessitated extensions to the original buildings. At the coupling department, two rotomatic coupling reaming machines were completely rebuilt and modernized.

Increase in Open-Hearth Furnaces and Capacity in Gross Tons

Completed in 1931:	Furnaces	Capacity
Independent companies	13	1,095,000
United States Steel Corporation	25	2,980,000
Total	38	4,075,000
Under way for 1932:		
Independent companies	1	100,000
United States Steel Corporation	..	.....
Total	1	100,000

Perhaps it **CAN** *be rolled*

MANY manufacturers have been enabled to materially reduce their production costs by using a rolled shape in place of a drop forging or a complicated machined section, or one made up of several parts by welding or riveting. The complex nature of sections that can be and have been rolled may amaze you. Those pictured here are but a few of the many thousand unusual shapes we roll for manufacturers of every type of product··door hinges, magnetos, typewriters, baby carriages, automobiles, threshing combines, road machinery··an almost endless list.

It may be that you can simplify the manufacture of your product by the use of rolled shapes. In these days every possibility of cost reduction is worth considering. It may mean the difference between profit and loss. Carnegie engineers will be glad to consult with you.

Perhaps it ***can*** be rolled.

CARNEGIE STEEL COMPANY

Subsidiary of United States Steel Corporation

PITTSBURGH, PA.

168

INDIANA HARBOR WORKS

Tube Mills: A butt-welding machine for end to end welding of double length pipe, including necessary handling and auxiliary equipment; a new straightener and rotomatic threading machine in buttweld mills Nos. 4 and 5.

General: Control system for blast furnace gas to boilers, and a new 50 ft. x 200 ft. pattern storage building.

BRIER HILL WORKS

Open-Hearth Department: A fuel oil system and provisions made for the equipment to handle tar as fuel.

Sheet Mills: Two continuous pair and two continuous pack furnaces installed, including conveyors for delivering breakdowns and packs to and from furnaces, doublers and shears.

Plate Mill: The re-installation of the 4-high mill.

Tube Mill: A complete new electric welded tube mill for making large pipe, including buildings for housing the equipment.

SOUTH CHICAGO WORKS

Blast Furnaces: Installed a thickener and dryer for reclaiming flue dust.

Weirton Steel Co.

The Weirton Steel Co., Weirton, W. Va., erected an extensions 50 ft. by 60 ft. to the warehouse at the Weirton tin mill to be used as a lacquer department for the coating and storing of black and tinned plate. A dump type oven for crystalline work and another straight-away type of oven were installed, together with two lacquer paint coating machines. Coke oven gas is used for heating ovens, and special attention has been given to a vacuum cleaning system for the cleaning and filtering of air.

A high-speed frequency cold saw was installed at the Weirton structural mill to take care of additional warehousing of structural steel sections.

In the strip steel department at Weirton a four-arm pickler was installed at the wide strip mill in addition to various finishing equipment. The 12-pass continuous roughing and looping finishing train of the 10-in. hot strip mill was arranged for the rolling of rounds and squares from ⅜ in. to 1⅜ in., and angles from 1 in. by 1 in. to 2 in. by 2½ in., inclusive. This mill was also arranged for the rolling of the formed concrete bars in the range of rounds and squares listed above. No additional roll stands were added. Also in the strip steel department motor driven tables were installed in front of the two shears at the hot beds. A warehouse building 60 ft. by 225 ft. was erected for housing bar sections rolled on this mill, together with necessary shearing and straightening equipment for handling this material.

Also at the Weirton plant the capacity of the coal unloading hoist at the river dock was increased from four tons to six tons. A slag crushing plant, using slag from the blast furnace slag dump, was placed in operation.

At the Clarksburg, W. Va., tin mill the hot and cold mill drives were changed from steam to electric, but no additional roll stands were installed. Steam engines for driving the hot and cold mills were eliminated, and also the greater part of the boiler house. A 1000-hp. synchronous motor was installed for driving four stands of hot mills. A 2000-hp. synchronous motor was added to drive eight hot mills, and a 500-hp. motor for the cold mills. Gear reducing units were installed between the motors and mills. The Clarksburg plant is now entirely electrified.

Jones & Laughlin Steel Corpn.

The Jones & Laughlin Steel Corpn., Pittsburgh, is completing a tube mill of the push bench type at its Aliquippa works. During the year a normalizing furnace was installed in the tin plate department at the same works, and a 10,000-kw. frequency changer with high tension power lines was added at the 14-in. rolling mill.

At the company's Pittsburgh works an electric arc furnace is being installed in the foundry department.

In January, 1931, the Jones & Laughlin company acquired the concrete bar plant and equipment of the E. J. Whalen Construction Co., Louisville, Ky., for warehousing purposes. In March the New Orleans warehouse and fabricating shop of the Lukens Steel Co. was purchased.

Firth Sterling Steel Co.

The Firth Sterling Steel Co., McKeesport, Pa., installed a 12-in. hot mill, an 8-in. cold rolling mill, a one-ton Ajax electric induction melting furnace, and a Leeds & Northrup nitriding furnace during 1931. During the year the Detroit Wire Die Co., Detroit, under a working arrangement with the Firth Sterling company, established a branch plant on the latter's property at McKeesport. Drawing and extrusion dies with nibs of cemented carbide composition are produced in this shop, which also enjoys the facilities of the Firth Sterling laboratory.

Ford Motor Co.

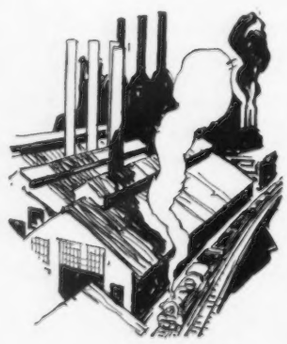
Ford Motor Co., Fordson, Mich., has under construction a 400-ton open-hearth furnace of the tilting type which will replace one of its present 100-ton stationary open-hearth furnaces which has been dismantled. Two 600-ton hot metal mixers are being added to replace one 600-ton mixer, which has been dismantled. This company did not erect any additional steel-making equipment during 1931.

Empire Steel Corpn.

Empire Steel Corpn., Mansfield, Ohio, erected two pack furnaces at its South Plant, Mansfield, during the past year at a cost of $65,000. It has no definite plans for extensions during 1932.

Otis Steel Co.

Otis Steel Co., Cleveland, practically finished the construction of a new 72-in. continuous strip mill at its Riverside Works, which was started early last year. This plant is expected to be placed in operation early this year. The new mill consists of ten stands, six roughing and four finishing. The steel in the form of hot rolled strip will be delivered from the mill in coils or to a large hot bed and cut to plate lengths on shearing equipment of a new design. The mill will be operated in connection with the company's blooming mill. It occupies space provided by an extension of the blooming mill building. Equipment includes triple fired continuous slab heating furnaces. The roughing mill stands will be driven by individual motors of 1200- to 3000-hp. capacity, three finishing stands by 3500-hp. variable speed d.c. motors, and the last finishing stand by a 2500-hp. variable speed d.c. motor. Current for the d.c. motors will be supplied by two 4000-kw. motor generator sets. An 800-hp. motor has been installed for operating a scale breaker. The mill stands and auxiliary equipment were built by the United Engineering & Foundry Co. and the heating furnaces by the Rust Engineering Co. The General Electric Co. furnished the motors and other electrical equipment. The company is now constructing a cold mill to operate in connection with the continuous mill and a 72-in. pickling machine.



Miscellaneous Improvements

The Globe Iron Works, Jackson, Ohio, installed three Cottrell precipitator units for gas cleaning at its blast furnace.

Interlake Iron Corpn., Chicago, completed early in December last year rebuilding "B" furnace at its Federal Plant, South Chicago. Both the diameter and the height of the stack have been increased, augmenting the capacity from 500 tons a day to between 650 and 700 tons.

The Inland Steel Co., Chicago, is installing a continuous hot and cold strip mill.

Wickwire Brothers, Cortland, N. Y., added last year a small bar mill to operate in connection with its continuous rod mill.

The Rockaway Rolling Mill, Rockaway, N. J., last year added a continuous billet heating furnace.

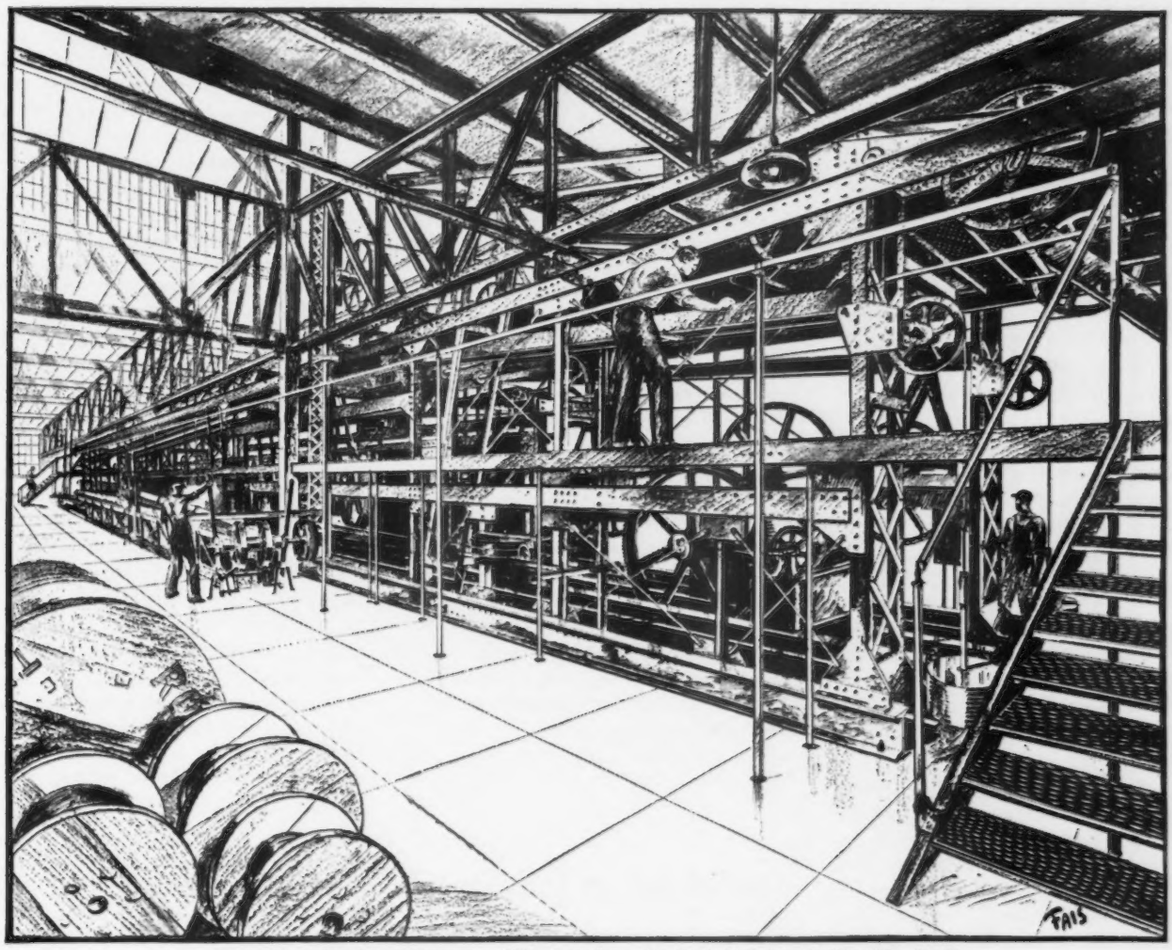
The Falls Hollow Staybolt Co., Cuyahoga Falls, Ohio, built and put into use last year two new oil-fired heating furnaces having a capacity of approximately six tons.

The Eastern Rolling Mill Co., Baltimore, added last year two galvanizing pots to use a portion of its present sheet capacity.

The Sterling Steel Foundry Co., Braddock, Pa., built and put in operation last year one 10-ton open-hearth furnace for the production of small castings and alloy steel. There was also put in operation a new Pangborn sand blast with an operating room 16 ft. by 27 ft.

The Ohio Steel Foundry, Lima, Ohio, last year started the production of carbon and alloy steel rolls for rolling mills and installed machine tools for finishing these rolls.

The Vulcan Mold & Iron Co., Latrobe, Pa., rebuilt a large part of its equipment during the year, and added a crane and crane runway for the handling of raw materials. New sand blasting and heat-treating equipment was also added, but the company's capacity was not increased.



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Shown above, for example, is the world's largest wire rope fatigue machine, developed by Roebling exclusively for their own study of rope characteristics. With this machine is carried on a never-ending search into the wearing and fatigue qualities of wire rope under various bending and tension conditions.

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ROEBLING "BLUE CENTER" STEEL **WIRE ROPE**

Mechanical Handling Moved Forward in 1931

(*Concluded from page* 101)

girders are now being welded instead of riveted, or cast.

Hand truck and caster manufacturers have improved their products either with pressed steel parts, drop forgings, or built up welded construction. Better tread surfaces and methods of attaching tires have been developed. Special hand trucks for given products or containers are being built and the standard stevedore and platform trucks have many improvements.

Manufacturers of various types of handling equipment have found it advisable to specify, and in many cases install, electric control devices to protect their equipment from a safety standpoint. There is no doubt that one of the cheapest forms of safety is electric limit switches, and their proper application prevents serious breakdown and also acts as an operation check. This is particularly true on continuous automatic conveyor systems.

For many years electric trucks have all been equipped with the very best type of electric control and so have electric hoists, but this year has brought out the more extensive use of electric switches, relays, electric controlled operators, etc., for performing mechanical movements which are applicable to continuous conveyor systems. The photo electric tube is only in its infancy and the author has previously described one application in conjunction with overhead monorail system, but in addition the photo electric tube is being used for operating diverters, switches, automatic stops and releases, etc., in connection with belt, gravity, overhead chain and other types of conveyors. There are also systems designed using pins for actuating the electric switches which control various mechanical movements.

In the gasoline propelled industrial vehicles, we find new models and new designs comparable with those in the electric industrial truck field, and the manufacturers are willing to build special equipment to perform given operations and they also have made a complete revision of standard models. The use of gasoline-driven generator units applied to the gasoline industrial truck field permits the use of electric controls for quick starting and stopping without the necessity of shifting gears, etc., but still permits the gasoline motor to be the source of power.

The above resume of mechanical progress shows that the manufacturers are alert to customers' needs and there is hardly a handling or transportation operation in industry that cannot be performed mechanically by some existing form of equipment. When one does exist the manufacturers are willing to devote time and money to the solution of the problem.

The past year has caused the manufacturers to reconsider their selling arguments. In the past their equipment sold on the basis of "labor-saving" or payroll reduction, but under existing conditions these arguments cannot be used; in fact, they are obsolete. For this reason, attention is being given to space conservation, quality control, direct routing, time control, safety to personnel, reduced damage to work in transit, betterment of working conditions, reduced fire hazards, reduced inventories, inspection control, and many other factors that were formerly overlooked. Educational work started in 1931 will no doubt be carried forward in 1932 to call these factors to the attention of management so that they will be given greater consideration than in the past, when the main item brought forward in selling this equipment was payroll reduction.

The manufacturers of materials handling equipment have come to a realization that it is necessary to do a more extensive bit of education, and several have prepared talks which some of their own executives and also engineers are presenting before businessmen's associations, chambers of commerce, college students and other groups.

The American Society of Mechanical Engineers has received reports from a manufacturers' committee connected with its Materials Handling Division which indicates that progress can be made by developing a better understanding of engineering formulas, possible standardization and definite specifications as to equipment capacities, etc. The trade associations connected with this industry have made progress during the year with interchange of ideas among members, some marketing studies and the creation of confidence in their members.

The manufacturers themselves realize that it is necessary to effect changes in their marketing methods and many experiments have been tried in the past year, all of which will no doubt lead to progress in 1932.

▲ ▲ ▲

Confidence in Stability of Money Is One Great Need

(*Concluded from page* 24)

The gist of this discussion is that our chief problem lies in the field of money and banking and the reestablishment of confidence in the value of money. We are jeopardizing the solution of this problem by the establishment of "credit corporations" and "finance corporations." These may conceivably be helpful if they are strictly safeguarded to prevent inflationary developments and are operated merely to act as "receivers" for securities and property which have to be liquidated. But the greatest single step toward recovery would be to give assurance that money will be stable in the sense that gold is stable, and that debts will be valid in the sense that obligations of debtors are definitely recognized—no matter what arrangements in the way of extensions or necessary readjustments in principal and interest may be required as a matter of equity or expedience.

World Awaits International Settlement

ULTIMATELY, it seems just now that the end of the world-wide depression and the dawn of the next period of world-wide prosperity must come through some great international settlement. Such a settlement would involve (1) a drastic readjustment of debts, (2) a revaluation of the pound sterling and the return of England to the gold standard, (3) a recognition by the United States and France of their obligation as the possessors of most of the world's gold, and (4) a general tariff revision. None of these things can be accomplished without international agreement and the establishment of international cooperation.

In conclusion, may I add a word of economic doctrine which seems vital to any sound dealing with our internal problem? We cannot begin any sound recovery by attempting to boost incomes for the purpose of stimulating production and employment. We cannot give people money to spend by taking it away from others (by taxation) or from all (by inflation). As a nation, we cannot create wealth by expanding credit, nor income by making notes. The only source of income is production, and the only basis of spending, by laborers or anyone else, lies in earnings based on production. If the people of the United States cannot produce, neither can they consume. When we learn to cut the coat of consumption to the cloth of production, we will have enough to wear.